

AN ECONOMIC MODEL TO PREDICT FUTURE STATE OF NATURE AND  
CORRESPONDING STRATEGIC POSTURE

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General Studies

by

JUAN P. REMY, CPT, ARMY

M.S., University of Texas at El Paso (UTEP), El Paso, Texas, 2006

Fort Leavenworth, Kansas  
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THESIS APPROVAL PAGE

Name of Candidate: CPT Juan P. Remy

Thesis Title: An Economic Model to Predict Future State of Nature and Corresponding Strategic Posture

Approved by:

\_\_\_\_\_, Thesis Committee Chair  
Patrick C. Beatty, M.A.

\_\_\_\_\_, Member  
LTC Steven W. Holden, Sr., M.S.

\_\_\_\_\_, Member  
Kenneth E. Long, D.M.

Accepted this 9th day of June 2017 by:

\_\_\_\_\_, Director, Graduate Degree Programs  
Prisco R. Hernandez, Ph.D.

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## ABSTRACT

AN ECONOMIC MODEL TO PREDICT FUTURE STATE OF NATURE AND  
CORRESPONDING STRATEGIC POSTURE, by CPT Juan P. Remy, 107 pages.

The research investigates a qualitative military economic model and propose scenarios as a guide to understand the complexity of the socio-political situations, surrounding the federal budget, that impacts strategic military policies and postures. It focuses on causative effects, specific from trends and variables. The following primary research question was examined: Can we build a descriptive strategic budgetary planning model, using the principles of the Balanced Scorecard and systems dynamics to develop insights into a requirements document for a robust, predictive model so that the military can effectively prioritize its planning and programming to match future capabilities for emerging national military requirements? This is an applied professional research case study addressing an existing issue within the formulation of strategy to support future states of nature with a conceptual framework using qualitative and a quantitative method. The research is a mixed methods research.

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## ACRONYMS

CBO	Congressional Budget Office
GDP	Gross Domestic Product
NMS	National Military Strategy
NSS	National Security Strategy
OMB	Office of Management and Budget
PPBE	Planning Programming Budgeting and Execution
SoN	State of Nature
US	United States



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## CHAPTER 1

### INTRODUCTION

The significant problems we face cannot be solved at the same level of thinking we were at when we created them.

— Albert Einstein

#### Background

The national debt is the worst enemy to military readiness in any future scenario outcome. That comment was echoed by Senator Rand Paul at the presidential debate in December 2015. He said, “we are not a stronger nation if we go further into debt. We are not projecting power from bankruptcy court” (Jones 2015). During his 2016 testimony in Congress, US Representative, Tom McClintock, quoted then-Chairman of the Joint Chief of Staff, Admiral Mike Mullen, who affirmed that “the national debt is the biggest threat to national security” (US Congress 2016). In February 2017, Senator Joe Manchin sent a letter to the president regarding the budget which contained the same sentiments about national debt and national security (Targeted News Service 2017).

The national debt is a collection of annual deficits that, as of this research, totals 19.8 trillion dollars. The government attempts to maintain an inflation target rate of at least two percent to control the impact of the national debt. Consequently, when the debt is increasing faster than the rate of inflation, that can debase the dollar’s value over time. With a devalued dollar and increasing national debt, the government will pay more interest to finance the national debt, therefore reducing the funds available for the discretionary budget. Reducing the discretionary budget will usually reduce military

funding. This reduction in funding will translate to a decrease in military spending and diminish the government's capability to provide for national security (Everingham and Anderson 2011). The military must have a way to monitor the national debt and integrate it in all planning because it is the main stressor to our economy in any future scenario outcomes with regards to military decision making and readiness.

The 2014 Quadrennial Defense Review (QDR) dedicated a chapter explaining how the United States (US) Department of Defense (DOD) had to take steps to balance their budget to encompass the constraints of federal sequestrations and reforms. The 2015 National Security Strategy (NSS) identified the US' economy as essential for the country to lead with purpose globally (DOD 2014). The National Military Strategy (NMS) emphasized that the military supports all actions that encourage the country's enduring national interests which includes a growing US economy. From those enduring national interests resulted the security of the global economic system as a national security interest. Those three strategic documents reinforced the notion that the military's strategic posture must be the result of calculated and forecasted decisions.

A Harvard Business Review article (1999), explained that good strategy regarding the future should include scenario planning with uncertainty because it is an appropriate strategy for handling complex problems like deciding the future military strategic posture. If uncertainty is not taken into consideration during planning, solutions or decisions for the future state of nature will not include the correct actions to capitalize on opportunities or defend against threats. Thus, military future planning for the strategic

posture can be a problem of strategic hedging, a complex problem at Level 3 in this model, rather than merely complicated or chaotic.

The purpose of the Army is to fight and win the nation's wars. It supports the NSS and NMS by maintaining a force ready to support the national instruments of power. Congress approves the budget and the executive branch establishes priorities and requirements for the military to meet. Military decision makers use the budget to raise, train, man, and equip a ready force to meet the national requirements.

Military strategic requirements can change quickly based on international conditions and global economic conditions. As such, the Chairman of the Joint Chief of Staff must be prepared to adjust the type and composition of forces, and capabilities to best match the force with the demands in the future.

It is necessary for the Chairman of the Joint Chief of Staff to have a process to adapt spending programs which align with likely future requirements, missions and resource levels. Without such a strategic budgeting model, the CSA runs the risk of having an ill-prepared Army to meet the nation's emerging needs. This project or research is an initial attempt to describe what such a model might look like. It will use a combination of models and concepts to explore the dynamics of building such a strategic model with the idea that by building a descriptive model we may gain insights into what a larger, mature, and professional model ought to incorporate. In another way, the development of a small-scale model can inform the design process for a larger and more prescriptive model, which is in keeping with the principles and best practices of the systems dynamics discipline. The actions of systems in the model will be used to

recognize important trends over time that can impact military decisions regarding the future strategic posture (Meadows and Wright 2008). For that matter, since long-term contracts and programs cannot change overnight without incurring excessive transition costs, future planning under uncertainty must be conducted accurately as possible to successfully hedge and bet on military future military capabilities.

Reductions in the budget and the devaluation of the dollar can lead to constraints on the military and national security budgets. The military must use strategic thinking and planning to forecast their budget in order to acquire the capabilities needed to support the required future strategic posture. The military must produce scenarios that depict possible alternatives state of nature and create portfolios of options to address those future outcomes. Scenario planning will enable the military to be better prepared to assume the precise military strategic posture for the future.

The National Intelligence Council (NIC) fifth series of publications intended to help leaders focus their views on the future, *Global Trends 2030: Alternatives Worlds*, emphasized that one of the main daunting challenges is trying to create a framework to understand the relationship between trends, gaps and possible threats in order to respond appropriately (NIC 2012). Strategic thinking and planning for uncertainty will enable the military to forecast the impact of the national debt on the country's future strategic posture in order to maintain national security. Our military decision makers must decide now what our strategic posture and military readiness will look like in 2030 by providing a clearer view of this instrument of national power with constraints of the looming national debt. Hence, the military and service secretaries should monitor certain variables

and their indicators which impact the federal budget and plan accordingly for those uncertainties in the future. Military decision makers must be aware of trends that may predict severely restricted defense spending because they may affect modernization, size, strategic posture, operational reach and readiness. Ultimately, this problem may result in America choosing different strategic postures because of different state of nature (SoN) in the future. For example, America may choose to become a regional power rather than a global superpower if its military capabilities cannot support the execution of power projection outside its region of influence and cannot support the NMS.

### Purpose

The purpose of this research is to investigate a qualitative military economic model and propose scenarios as a guide to understand the complexity of the social, economic and political trends surrounding the federal budget. These trends impact strategic military policies and postures with some causative effects from indicators and variables. The research will help identify and make the connections between indicators that can be recognized and tracked to develop military strategic postures. This research will describe two driving forces with variables that impact our federal budget. This will be coupled with specific priorities to choose the best military strategic posture from adapting, shaping or reserving the right to play (exert military power) in the future. The qualitative model incorporates scenario-thinking and a Balanced Scorecard approach to select indicators of the variables and create different possible outcomes for future national strategic postures. This will serve as a prototype for a more comprehensive model for future strategic planning, guidance and decisions. This model will provide the



basis for an understanding of the complex environment surrounding military force structure decisions. It will enable decision makers to forecast potential military budgets required to support future national strategic postures.

### Issue

The economy enables the United States to be a superpower. The issue is that the federal budget, a product of political priorities, drives the country's military strategic posture. The national strategic posture determines the military budget and consequently its size and readiness to support national security. The federal budget is a production from our economy that directly affects the military's budget. For example, if the budget only allows for a regional military force, America will not be able to project power globally and fight future conflicts in support of national security and interests.

### Problem

The problem is that the US national debt and constant annual deficits could lead to such a small discretionary budget that the military must reduce its presence internationally causing it to no longer remain a global superpower. Since economic and military changes cannot occur over night, future military capability must support future states of nature and national strategic posture. Military readiness depends on funding from the federal budget, therefore military decision makers should strategize on how to support the national strategic posture in different future scenarios while anticipating budget spending. The military needs to monitor trends and variables from social, economic and political priorities that will directly impact future federal budgets and thus military budgets.

### Primary Research Question

There are challenges that we can anticipate with strategic thinking and planning. The primary research question is: Can we build a descriptive strategic budgetary planning model, using the principles of the Balanced Scorecard and systems dynamics to develop insights into a requirements document for a robust, predictive model. That model will allow the military to effectively prioritize its planning and programming to match future capabilities to emerging national military requirements. This research paper will consider four variables that may be indicators of our national spending priorities, provide different scenarios based on those variables and recommend a possible portfolio to counter adverse effects of any scenario.

### Secondary Research Questions

In order to answer the main research question, we must first answer the subsequent subordinate questions:

1. What variables affect the federal budget and Gross Domestic Product (GDP) from a military readiness standpoint?
2. What set of indicators are relevant to each variable?
3. What are three reasonable indicators for each variable that could serve as gauges in a blended scorecard model for forecasting budget policy change?
4. What set of sample scenarios from the set of indicators will provide the most options for the future in relation to our national debt?
5. What are four primary future scenarios that we can forecast to allow the best portfolio of options to the military?

6. Can we develop a portfolio of actions (hedging and big bets) to guide the military through various possible national strategic postures?

### Assumptions

For this research, we assumed that there are indicators for specific variables that can be tracked to forecast federal budget size which consequently will determine the amount of funds available for military spending. Other assumptions considered while conducting the research are:

1. The budget process will not change.
2. The percentage of the military budget, available for the Army vs the other services, will not drastically change.
3. Insights gained from the descriptive model will inform a requirement process which defines the capabilities needed in a prescriptive model.
4. Insights gained from building a small scale descriptive model will be useful for Army leaders tasked with leading large econometric modelling projects.
5. The principles of the Balanced Scorecard and systems dynamics are useful in developing a descriptive model.
6. Professional experts could be tasked with developing specific prescriptive components of a robust model given the insights obtained from our descriptive model.
7. The Army could engage in effective hedging behavior at the lowest reasonable cost by forecasting probable changes in the future strategic states of nature that would drive national security policies.

8. Changes in the economic domain would be the most important predictor of realistic future national security postures as it places limits on the size of feasible forces and capabilities.

### Definitions of Key Terms

The terms below are defined to maintain consistency of meaning and context throughout the research:

Federal Spending-Federal Spending refers to the total of mandatory, discretionary and interest on the national debt (GAO 2005).

Gross Domestic Product (GDP)-The GDP measures the nation's economy. It is the total value of all final goods and services produced in an economy in each year. "Final" means the value of goods and services purchased by the final consumer, as opposed to the value of raw materials purchased by a factory (GAO 2005).

Levels of Uncertainty-From the Harvard Business Review (1999), after identifying the best mitigations and analyzing the uncertainty in future planning, residual uncertainty is the remaining of unknowns that could not be countered. The Harvard Business Review defined four levels of uncertainty: Level (1) Clear-Enough Future-Single forecast can determine strategy. Level (2) Alternate Futures-There is different possible outcomes for future planning. Level (3) Range of Futures-Key variables define the range of future, but outcomes can be anywhere on the spectrum. Level (4) True Ambiguity-Variables cannot be defined to identify any specific or potential outcomes.

National or Federal Budget-The National or Federal Budget refers to the total of revenues and spending for the government (Whitehouse.gov 2016).

National Military Strategy (NMS)-The NMS is submitted by the Chairman of the Joint Chiefs of Staff from guidance through the NSS. It is required by law articulated in 10 US Code § 153 which explains the Chairman's functions. It sets the ends, ways and means to accomplish the objectives set forth from the NSS (Joint Chiefs of Staff 2015).

National Military Strategic Posture-The national military strategic posture can be defined as the ways, ends and means a nation decides to use its military force in order to survive and protect its national interest (Gouré 2008). For this research, we will define four different National Military Strategic Postures:

1. Global Hegemony-Total military supremacy, no peer competitor and global control on all domains of warfare.
2. Competing Superpower-Sharing or competing military capabilities and burdens through alliances and coalitions with a few fellow superpowers.
3. Regional Power-Maintain a regional presence and focus on close alliances and coalitions in that region (the Western Hemisphere).
4. Homeland Defense-Concentrate on defending and protecting the sovereignty of the 50 states and national territories without involvement in international affairs.

National Security Strategy (NSS)-The NSS is the report that the president must submit annually to Congress with the budget request. It is required by law, sets the nation's priorities, interests, concerns, ways that the instruments of power will be used. Finally, it provides a foundation for the president's budget request. (Public Law 99-433, Section 603).

Portfolio of Actions-From the Harvard Business Review (1999), depending on the strategic posture selected, a portfolio of actions needs to be available to effectively counter the different outcomes in different scenarios. He identified three options for a portfolio. First, “big bets” provide complete win or lost adopted for a scenario. Second, “options” are ways to secure a win while minimizing lost in the same scenario. Finally, “no-regrets” are actions that will generate a win in any scenario.

Quadrennial Defense Review (QDR)-Prepared by the Secretary of Defense every four years or when a new president is elected. It provides the specific guidance on structure, modernization and budget plans to support the NSS objectives (DOD 2014).

Strategic Postures-For this research Three Strategic Postures are used in future planning with uncertainty. The three postures are: *Shaping*-creating rules or taking steps to create a desired environment. *Adapting*-taking actions to create opportunities from the current environment. *Reserve the right to play*-investing in the current environment to decide when it will be the right time to act in the future (Harvard Business Review 1999).

### Limitations

The most relevant limitation is the volume of constant changes in research data during the research. Also, the complexity of strategic economic models, the number of variables that could be used to model a national economy and the number of indicators that could be used to model the variables’ range of behaviors restricted analysis. This study will focus on information available and collected during a nine-month span. New developments in technology, changes in the environment, trends in social entitlement spending and fluctuations in the national debt will require future update to the study and

model. The professional decisions that are directly influenced by the daily integration of the service chiefs and secretaries cannot be used because they can be a source of strategic budgetary bias.

Other limitations include the author's limited experience in federal budgeting and strategic planning, the access to classified documents and politically-oriented documents and their interpretations.

### Scope and Delimitations

This research will study the current state of the federal budget, the NSS and the relation between drivers and variables that can affect the budget and produce an effect. Also, unexpected political events, like scandals or impeachment and actions that will trigger the declaration of war will not be factored. The author had the following bias while conducting this research; the author believes that the US government should focus on balancing the budget to strengthen our economy, providing better social opportunities for the American people while maintaining the military capabilities required to support the country's national security. Spending less on global power projection will allow the government to focus on debt reduction which will enable more spending on social entitlements to provide a better future for the American people.

### Significance

History is full of the rise and fall of great civilizations. Imagine the day when America is not the world superpower and cannot afford to be the global policeman due to a weak economy and too much debt. What will the American military be able to afford to

do and spend in 2030? Will it be a diminished superpower like the British or French?

How should the military strategize to prepare for alternate futures?

The fact is, if decision makers do not correctly forecast the strategic posture in the future, the national security will be at stake and freedom, as a nation, will be jeopardized. One of the main driving forces for the country's current superpower status is the ability to be expeditionary and project military power anywhere in the world. However, that military power comes with a price tag that we might not be affordable in the future. The federal budget is the funding source for military power projection and influences the NSS. The result of this research will be the prototype of a model that could be modified and studied to update its elements for future strategic planning. This research will show how some indicators can be related to strategic decision-making and planning and the allocation of resources through the Planning Programming Budgeting and Execution (PPBE) process of the Department of Defense (DOD).



## CHAPTER 2

### LITERATURE REVIEW

This chapter explores the literature used to attain the knowledge to express the logic to answer the primary and secondary questions and frame the thesis for the research. The literature helped formulate the assertions and premises of the thesis. It facilitated identifying the relations between all aspects of the model and provided the historical context for the research. The literature review will be concentrated on previous works and documents, pertinent to the thesis, to allow the recognition of any gaps in the model's development. This research focuses on the following main topics: (1) the federal budget and debt, (2) current and future trends that affect the budget in relation to military readiness, (3) Balanced Scorecard approach, (4) strategic thinking, (5) managing uncertainty in future planning, (6) scenario planning, (7) alternate futures, (8) strategic posture for alternate futures, (9) Case Study Research methodology (10) Toulmin Model of Argument, (11) Elements of the model and, finally, (12) Modeling.

#### Impact of the Federal Budget and Debt on Future Military Readiness

To understand the interaction between the elements of the model and how they affect military readiness, the federal budget and deficit must be explained and analyzed. The federal budget can be considered as the spending priorities set by the government. The GDP is the report card of the economy because it measures the health of our economy and how it is evolving. It represents the total capacity for economic work. The federal budget refers to the total of revenues and spending for the government in a fiscal

year (Whitehouse.gov 2016). Federal Spending refers to the sum of mandatory, discretionary and interest on the national debt (CBO 2016).

In the 2016 federal budget, defense spending represents about half of the total discretionary spending. It is the third highest federal spending after social security, unemployment and labor, Medicare and health. Defense spending is 54 percent of the discretionary spending (National Priorities Project 2016b). When the government decides to reduce deficits by cutting federal spending, those cuts will most likely include reducing the military budget. Having 15 percent of the total budget, which represent 3.2 percent of the GDP, allocated to defense spending allows the US to be the world's superpower, but it is arguable that this superpower status came with an increase in the national debt during the past decades.

#### Current and Future Trends that Affect the Budget in Relation to Military Readiness

Current and future trends that affect the budget were consulted to identify the possible relevant and most impactful drivers that can change the future of military readiness.

In January 2017, the National Intelligence Council (NIC) published the *Global Trends: Paradox of Progress*. In the report, the NIC explained the economic, political, social, technological and cultural forces that challenge world order in the next twenty years. Those challenges must be managed for a peaceful and better future. In this research, the trends identified as critical that will continuously affect military decisions are: (1) Economic constraints, (2) Demographic changes, (3) Technology innovation, (4) Ideologies, (5) Government power, (6) Conflict evolution, (7) Climate change and

(8) Environment. Those trends helped identify the four variables for the model: Technology, Debt Servicing, Social Spending and Climate Change (NIC 2017).

### Balanced Scorecard

The Balanced Scorecard approach suggests that by picking a few important variables from a broad set of relevant factors, we can gain important insights from a relatively simple model, provided we do not try to ascribe too much fidelity to the resulting scores. It is useful for broad-based important signaling, but comes at the expense of sacrificing detailed fidelity.

It is appropriate for a complex environment in which the numbers of variables and indicators are too numerous to be exhaustively computed and integrated. In this research, the Balanced Scorecard approach was reviewed to create comprehensive scenarios with strong indicators related to variables, strategic posture and portfolios with substantiated options for the military. That approach allows forecasting the performance of the four drivers and their variables and provides alternative outcomes to military decision makers by using predictability and magnitude of impact on the budget. Kaplan and Norton (1996) introduced the notion of the Balanced Scorecard to help managers succeed in complex and ambiguous future environments. The Balanced Scorecard was originally introduced in 1992 to allow organizations translating their vision and strategy to tangible performance measures. It provides drivers to organizations' financial objectives and permits them to track performance across four perspectives: Customer, internal business, innovation and learning and finance. The Balanced Scorecard approach looks at past performances and compares them with the drivers' actions in the future. The result is a

scorecard that is well-adjusted from objectives, calculated outcomes and performance drivers to support those outcomes. The Balance Scorecard can also be used as a management system. See figure 1 (Kaplan and Norton 1996).

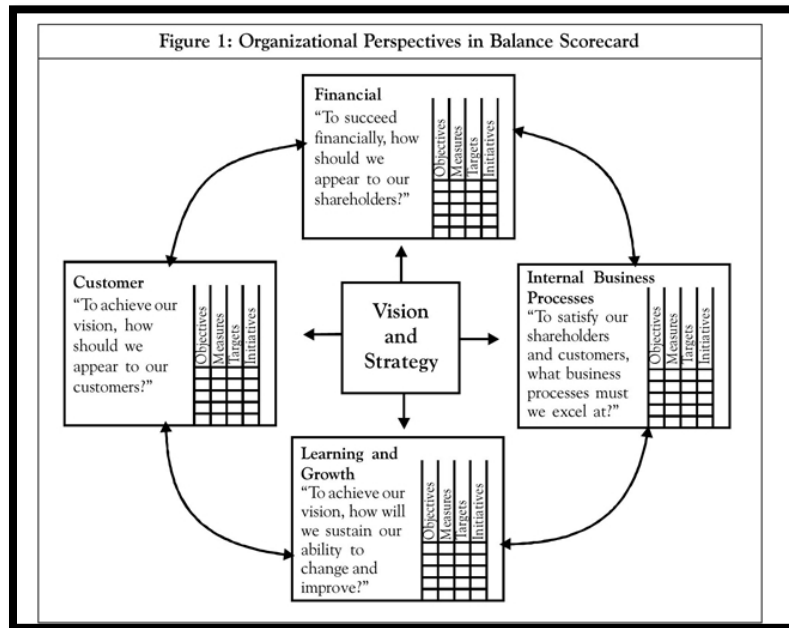


Figure 1. Organizational Perspectives in Balance Scorecard

Source: Robert S. Kaplan and David P. Norton, *The Balanced Scorecard: Translating Strategy into Action* (Boston, MA: Harvard Business Review, 1996).

However, there are some mistakes to avoid while applying the Balanced Scorecard to nonprofit and governmental organization. First, strategies are not concrete solutions and profit is not, often, tangible in governmental organizations. Government institutions have visions and missions, but their strategies are more focused on specific momentous objectives or lines of operations toward their vision and not on future outcomes' measurement from past actions. Second, initiatives are used as ways, not as

means to achieve ends. Finally, it is difficult to reach consensus at all levels in the organization (Dogan and Ozleblebici 2015). Sharma stated that most organizations want to improve their performance but fail to have adequate performance measures indicators to support their objectives, but argues that Balanced Scorecard provides that capability when applied accurately. He also explains that a Balanced Scorecard will grant an organization the ability to align their desired environment, the future, with their operations if they follow a nine-step process (Sharma 2009) (see figure 2).

Zimmerman provides a detailed analysis of the Balanced Scorecard and its implementation for nonprofit organizations. He argues that the Balanced Scorecard should be modified to support the type of nonprofit organization and it should not be used as a formula with exact results. He explains that Balanced Scorecards are means to an end, not an end itself. He enumerated some key actions to be taken while developing and implementing the Balanced Scorecard in a nonprofit organization. The actions should be executed as follow:

1. Find out what is important for the organization by analyzing its mission and vision.
2. Find out what needs to be measured and why it needs to be measured.
3. Get meaningful measurements.
4. Get reliable data for the measurements.
5. Educated about the analytical techniques use to interpret the data.
6. Do not introduce too many data points.
7. The metrics will become management tools.

8. Use metric measures that relate to the desired environment or outcomes.
  9. Test the metrics and used the results to improve the Balanced Scorecard
- (Zimmerman 2009).

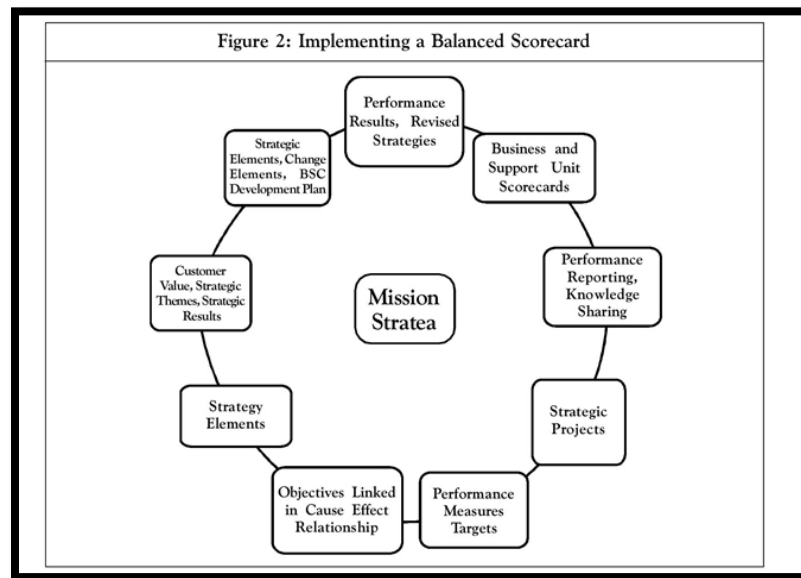


Figure 2. Implementing a Balanced Scorecard

Source: Joel Zimmerman, “Using a Balanced Scorecard in a Nonprofit Organization (cover story),” *Nonprofit World* 27, no. 3 (2009): 10-12, accessed November 7, 2016, Business Source Complete, EBSCOhost.

### Strategic Thinking

To start the research, the author started by trying to understand how to think to produce the best level of analysis about the subject. A thinking process of “perceiving, understanding and reasoning” was used to understand the basis for the research.

Perceiving allowed the author to plunge into materials relevant to the subject to develop his cognizance and knowledge base. Understanding helped to identify, synthetize and

organize the materials while connecting them to each other. Reasoning produced the creation of premises, inferences and conclusions based on the materials (Wells 1998).

After understanding the thinking process, strategic thinking needed to be comprehended. In his book, *Strategic Thinking: A Four Piece Puzzle*, Birnbaum provides an explanation of how strategic thinking is different than strategic planning. He explains that strategic thinking allows for a broader aperture to be used when analyzing problems with less planning constraints. He also stated that the “strategic shared vision” within management teams is important because it profits from conducting strategic thinking. Those management teams are the military decision makers at the strategic level. They need to be convinced that the problem with our federal budget is affecting the military’s capability to maintain a superpower status. This research will evaluate and employ the methods of identifying opportunities and threats to develop the model at the macro and micro-environments affecting our federal budget. The aspects of the macro-environment taken in consideration for this research are: Society, Economy, Environment and Technology (Birnbaum 2004).

### Managing Uncertainty

There are many uncertainties in proposing a model that reflects the future. Managing and trying to identify uncertainty can be complicated and frustrating. The model will be flawed by failing to identify the correct unknowns for the future. Making the wrong assumptions will lead to strategies that are neither favorable to the threats or opportunities. The Harvard Business Review also identified four levels of uncertainty that are relevant for this research. At level 1, the clearly identifiable trends provide concrete

information to have a “clear-enough future” *and* we can provide a clear outcome for the future. At level 2, the unknown trends, that can become known after the analysis, can provide “alternate futures”. In that case, we can forecast different outcomes and provide the best strategy based on which one occurs. At level 3, ranges of futures are provided on a continuum and can occur at any point in that range. Finally, at level 4, there is a true ambiguity, no range of outcomes can be recognized, no scenario can be constructed and no variables can be projected. For this research, a level 3 uncertainty is considered to propose the model (Harvard Business Review 1999).

### Alternate Futures

Because a level 3 of uncertainty is assumed, a set of scenarios will define alternate futures that are prompted by variables that signaled which scenario is the most probable (Harvard Business Review 1999). An alternative futures analysis will be applied because of the level of complexity in developing the model and the uncertainty for the outcomes. That technique will allow the military’s decision makers to analyze, combine many variables and constructs probable futures while considering the costs, risks and outcomes (CIA 2005).

### Types of Strategic Posture for Alternate Futures

An “adapting strategic posture” will be used which allows us the defining the current situation, predict its fruition and have a strategy to react to the different scenarios that can occur (Harvard Business Review 1999). The Decision Support Tools (DST) proposed by the Business Review (2013), provided the tools to construct the model. The DST laid out the quantitative and information aggregation tools and the qualitative and



case-based decision analysis. Those tools and analysis provide the framework for selecting the best strategic posture for each state of nature. The model will allow the military to invest in the right capabilities to match its desired strategic posture. The military will recognize the variables and react to them accordingly and quickly enough to avoid degradation of the required capabilities to accomplish their mission (Lovallo, Courtney and Clarke 2013).

### Scenario Planning

Decision makers can use scenarios to forecast alternate future states of their environment, create different courses of action to counter the negatives and emphasize the positives and allocate resources to match the demands of the future (Neil, Hinkle, and Morgan 2016). After identifying the variables and drivers for the federal budget, this research will produce a complex qualitative model with many outcomes and uncertainty for the future. Scenario planning was chosen to provide a better view and understanding of the variables affecting the federal budget and military readiness. Scenario planning helps create different possible pictures of the future and depicts the desired and probable results. Using the Lindgren and Bandhold scenario planning approach can assist in understanding the complexity of all the variables and reduce fallacies in the model (Lindgren and Bandhold 2009).

The scenario-planning methodology was applied to identify the key forces and drivers of the model, formulate the criteria measuring the variables, isolate the relations and interaction between the variables and to rehearse the future with the specific scenarios providing possible recommendations (Ralston and Wilson 2006). The principle

of iterative scenario building from Van der Heijden was consulted to analytically process the model as a system expressed in scenarios composed from the different outcomes. Van der Heijden's approach to scenario planning provides the foundation for scenario strategizing building and framing. Also, it describes what a scenario is, defines the different elements and the steps to track progress (Van der Heijden 2007).

### Case Study Research Methodology

This research design is like a "grounded-theory qualitative research" because time and resources are insufficient, the researcher is the primary reviewer of current documents and data. The research tries to create a theory to explain the action, interaction and process of different variables within the federal budget that ultimately affects military readiness. The research is designed as "explanatory" to show cause- and-effects between those trends that affect the variables of the federal budget and influence military readiness (Hancock and Algozzine 2011).

### The Toulmin Model of Argument

in 1996, Stephen Toulmin introduced a model to facilitate logic behind thinking. The model contains three main parts: the claim, data and warrant. The claim is the principle of the argument, the data provide evidence to the claim and the warrant links the claim to the data. Later three more components: qualifier, reservation and backing are presented to reinforce the main parts. The qualifier shows the likelihood of the claim, the reservation is a counter to the warrant and the backing rationalizes the warrant (Kneupper 1978) (see figure 3). Toulmin made us aware that certain logics are valid in certain fields of study while it will be more contested in others. For example, trying to explain to a

philosopher and a physicist why an apple falls faster in different areas on earth while using gravity theory (Toulmin 2003).

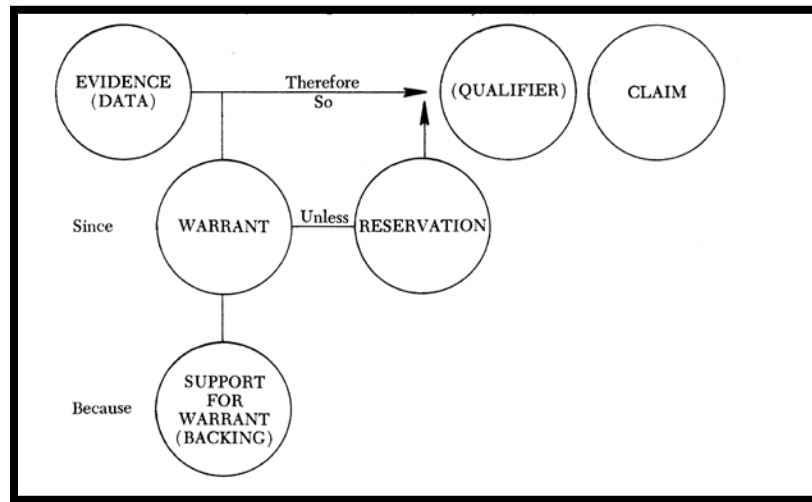


Figure 3. Toulmin Model of Argument

Source: Charles W. Kneupper, "Teaching Argument: An Introduction to the Toulmin Model," *College Composition and Communication* 29, no. 3 (October 1978): 237-241, accessed January 7, 2017, <http://www.jstor.org/stable/356935>.

This model of argument was used to frame the logic for the economic model and conduct this research. It was used to critically evaluate each indicator for each variable and established an argument-based framework for the descriptive model, so that each component could be separately examined. It helped produce a rational and exclusive model. This model of argument was accepted because it allows for discussion that can reveal the strengths, weaknesses and limits of the complete model. Each part or the whole model can be dissected and argued to provide a better equation to resolve the main research question.

### The Elements of the Model

The model will help decision makers monitor certain indicators of independent variables that affect two main drivers which will help them decide the strategic posture for different states of nature. The model represents the logic behind strategic thinking to facilitate future scenario planning. First, the size of the GDP and the source of funds dedicated to discretionary spending were identified as the two main drivers behind military funding and decisions. Second, four independent variables were selected because of their impact on GDP, discretionary spending and military funding. Third, a sample of indicators was chosen from a multitude of others that provides a way to forecast the variables' impact and effect on the variables by using the scorecard approach. Those variables, when combined, create four scenarios to represent a future state of nature (SoN) with corresponding national strategic postures that allow military decision makers to support national security directives from the president (see figure 4). To understand the model, we must comprehend its different parts and identify how they work as one to influence decision makers in planning for future strategic postures.

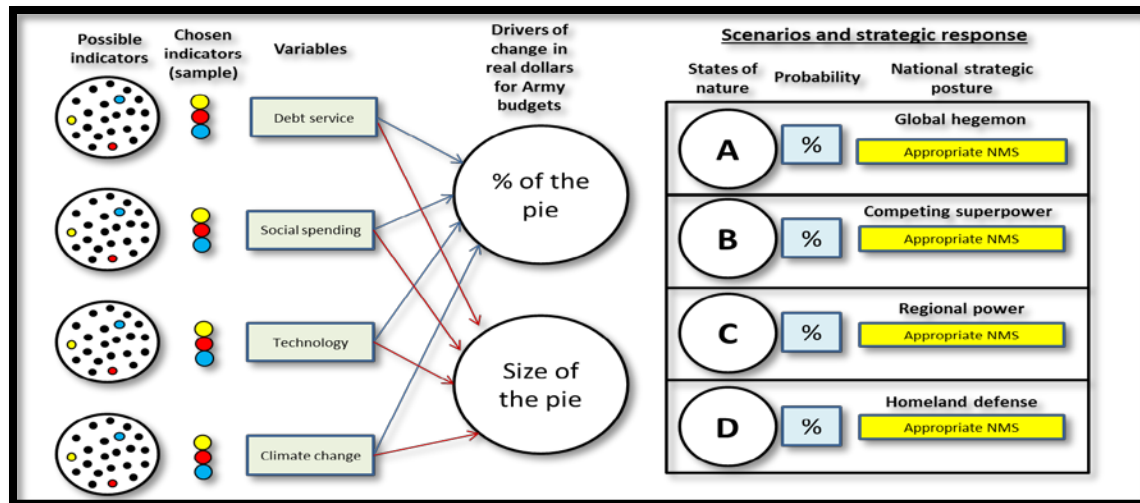


Figure 4. Descriptive Military Economic Model

Source: Created by author.

### The Size and Percentage of the Pie

Three things must be considered when explaining, on a macro level, the model, the Gross Domestic Product, the federal budget and the military budget. They all impact and influence decisions regarding how funds will be allocated and distributed in the future.

The GDP is how the size and health of the economy is measured. It represents where all funds will come from or be allocated to achieve the appropriate effects. GDP is the value of all goods or services produced in the entire economy in the US by foreign or local entities. It does not include anything that is produced outside the US. Therefore, it represents the best estimates of the US economy (Whitehouse.gov 2013). There is constant change in the GDP because variables within society influence the GDP. Changes can come from imports, exports, private investment, government spending, military

budget and federal spending (United States Department of Commerce, BEA 2016) (see figures 5 and 6).

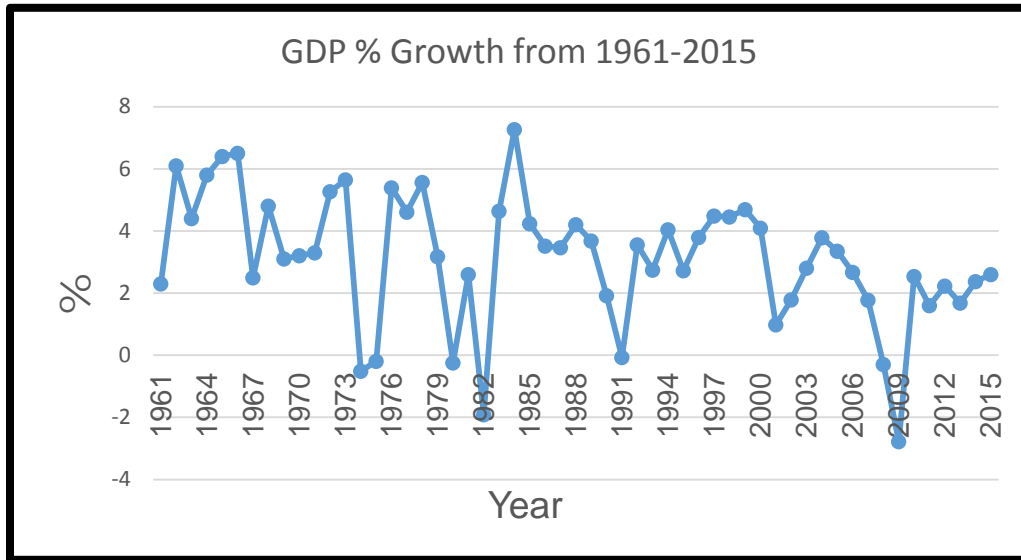


Figure 5. Gross Domestic Product Growth per year from 1961-2015

Source: The World Bank, “GDP Growth (Annual %),” accessed April 13, 2017, [http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=US&name\\_desc=true](http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=US&name_desc=true).

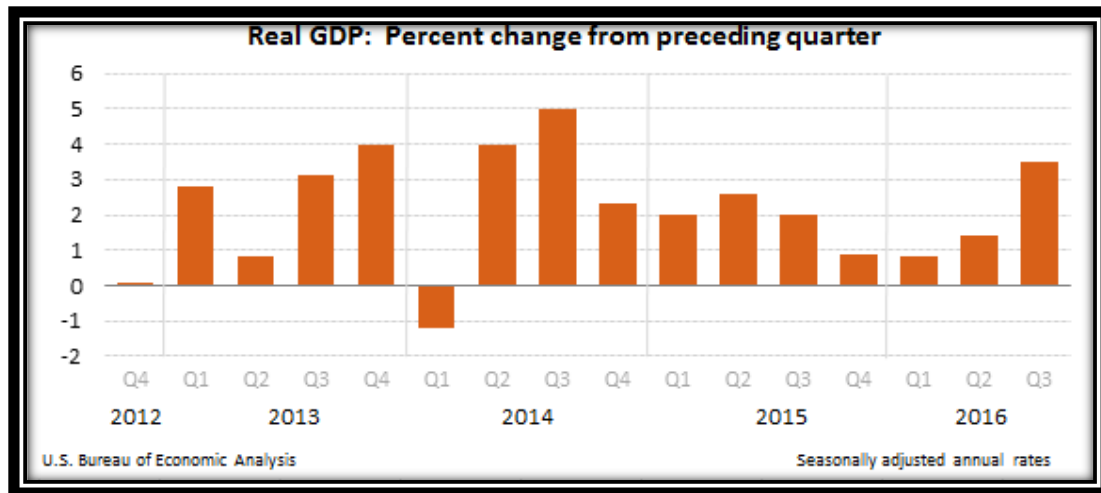


Figure 6. Gross Domestic Product Change per Quarter

Source: United States Department of Commerce, Bureau of Economic Analysis (BEA), “New National GDP Release,” accessed December 28, 2016, <https://www.bea.gov/news releases/national/GDP/gdpnewsrelease.htm>.

### The Size of the Pie: The Federal Budget

The size of the pie is the start point and the federal budget is represented by it. The federal budget is the total funds allocated from revenues for spending by law. It is how the government enable the country to meet its financial obligation. The budget is structured to provide the resources that allow the president and congress to decide the amount of funds to devote for specific spending and national priorities (whitehouse.gov). Also, the national spending must consider because this is where money is apportioned for the military budget.

National or federal spending can be categorized into three specific types: mandatory spending, discretionary spending and net interest on the federal debt. Mandatory spending is set forth by specific authorities and laws and is referred to

sometimes as direct spending or pay-as-you-go. Discretionary spending is managed by annual appropriations acts that can be changed during the fiscal year depending on actual dollar figures and value needed. Net Interest is the amount that the government will pay to service the national debt (CBO 2016). Federal spending, on average, has surpassed federal revenues and is projected to continue in the future (see figures 7 and 8).

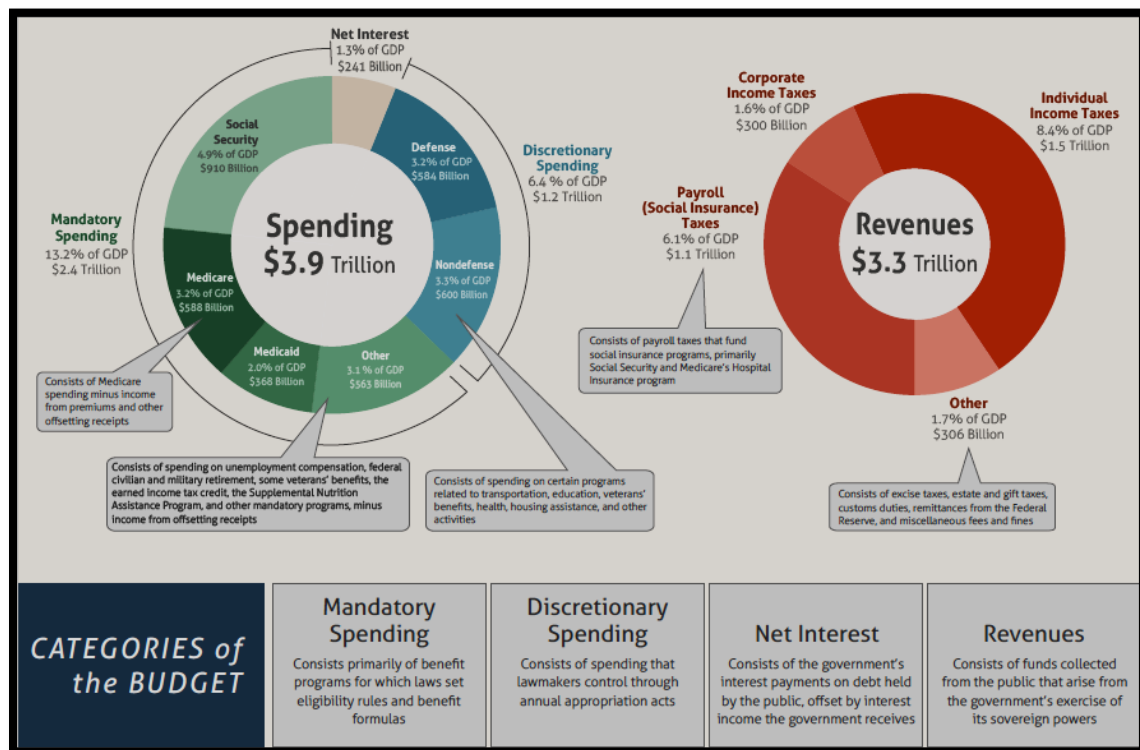


Figure 7. 2016 Federal Budget

Source: Congressional Budget Office (CBO), "CBO Glossary," accessed December 30, 2016, <https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/42904-CBOGlossary.pdf>.



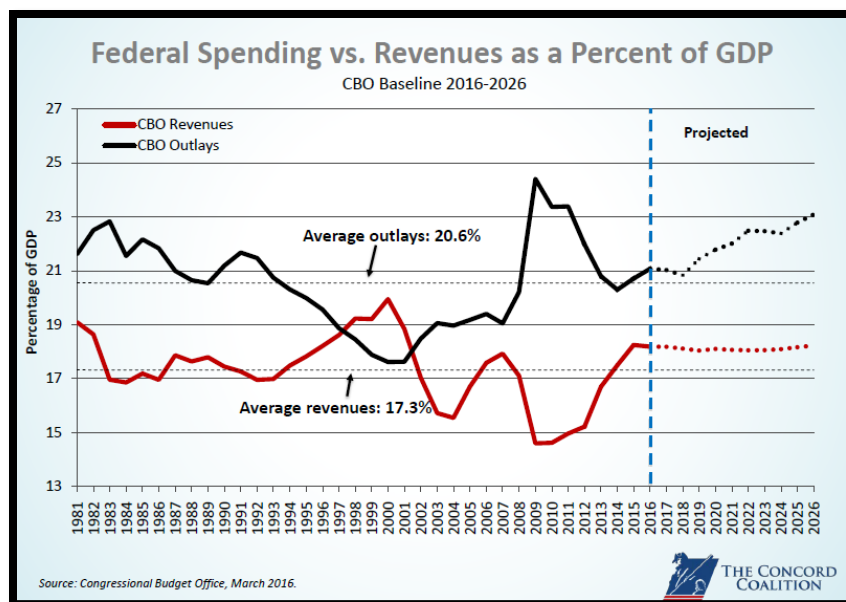


Figure 8. Spending vs. Revenues

Source: The Concord Coalition, “Federal Budget Pie Charts,” accessed April 13, 2017, <http://www.concordcoalition.org/issues/indicators/federal-budget-pie-charts>.

### The Percentage of the Pie: Military Budget

The military budget is included in the discretionary budget and, specifically, in the defense spending category. Since World War II defense spending has not been lower than 3 percent of the GDP. Military buildup and wars are the main contributors for surges to the defense budget. In 2016, the Office of Management and Budget, estimated the military budget represented almost 16 percent of the entire federal spending, 54 percent of the total discretionary spending and 3.2 percent of GDP (National Priorities 2016b). There are specific variables that affect the federal budget and ultimately the military budget.

The military budget dictates the course of action to fund resources to military decision makers. It represents the percentage of all government funds that are allocated for all military related affairs. To understand the two main drivers, the federal and military budgets, requires comprehending the federal budget and explaining its effects on the military budget. While GDP growth has been irregular, defense spending has been gradually decreasing except for spikes during wars (see figures 5 and 9).

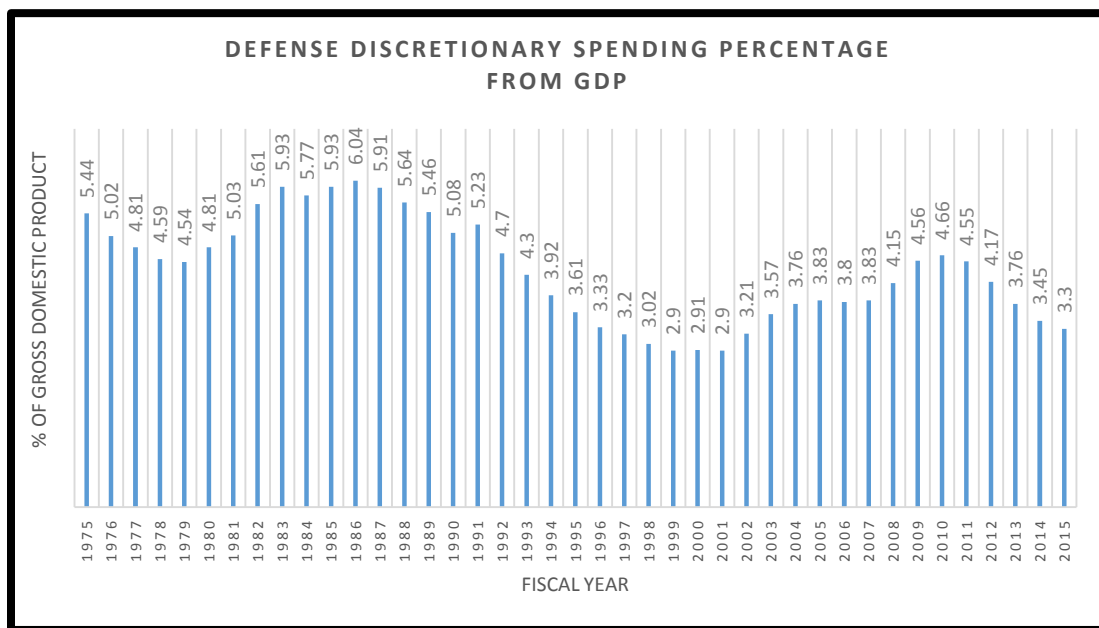


Figure 9. Defense Discretionary Spending Percentage of the Gross Domestic Product

*Source:* Created by author from data of Congressional Budget Office (CBO), “CBO Glossary,” accessed December 30, 2016, <https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/42904-CBOGlossary.pdf>.

The PPBE process is implemented by the Department of Defense (DOD) to allocate the budget and produce the resources that are required to man, train, equip and

resource the military. The purpose of PPBE process is to create a plan, program and defense budget to support the needs of Combatant Commanders. It records all planning and budgeting for current and future years. PPBE is the link between strategy, programming and budget. Therefore, when the strategy does not support the requirement from the programming and budget, the military will be ill-manned, equipped and resourced. For example, when the strategy for the war on terror required new capabilities to be programmed, due to a shift from military focus or policy change, the capabilities needed to be resourced. But, when the capabilities were delivered, they did not match the threats and state of nature (SoN) in Iraq, so it was a waste of funds and resources because decision makers did not forecast the correct strategic posture to match a future state of nature. This research will help reduce that risk by providing a possible model for strategic planning with options for possible future outcomes. Also, when programmed and resourced capabilities must be cancelled through PPBE, the budget succumbs to major constraints for future capabilities. It is the same when there is an accelerated acquisition process. The military is forced to spend extra funds to speed the process to produce capabilities for the force and state of nature. PPBE follows specific timeline, funding and resourcing regulations to produce the resources that Combatant Commanders need to complete their assigned missions (Army War College 2015).

With fiscal austerity and constrained resources, military decision makers must prioritize objectives while maintaining readiness and capabilities. But, when the military must change their capabilities and strategy to support an administration's major policy changes, those changes are executed with risks to match the current threats and realign

strategy with the state of nature. For example, in 2012, with the sequestration of \$1.2 trillion from the discretionary budget, the DoD budget was cut by \$500 billion. Those reductions in funds led to the reduction of troops in support of major operations in Iraq and Afghanistan. When the administration shifted its focus from the Central Command (CENTCOM) and European Command (EUCOM) areas of responsibility (AOR) to the Pacific Command (PACOM) AOR, the military had to realign their resources amid modernization and force reductions which degraded the readiness and capability of the current force. Risks exist with any strategy. Focusing on the PACOM AOR reduced our presence in the EUCOM and CENTCOM AORs. Since our threats, Russia and ISIS, in those two regions are surging, the military is forced to conduct multiple operations across the globe with less resources (Johnson 2012).

### The Variables and Indicators

J. F Rischard, the vice president of the World Bank, in his book, *High Noon: Twenty Global Problems, Twenty Years to Solve Them*, explicitly identified global changes that affect our planet in many ways. He explains future challenges or problems ranging from population increase, to nation-states struggles, to technology and economic revolution which must be accounted for when the government or organizations are creating strategies to provide services to customers (Rischard 2002). The military faces the same issues since they are part of that environment and should adopt global-problem-solving to identify alternative futures for strategic posture. The variables, in the model, are some essential aspects that stimulate the size and percentage of the pie which corresponds to the national and military budgets. This research concentrates on four

common themes or variables that have been identified as priorities in the Office of Management and Budget and the National Military Strategy.

In the 2015 NSS, the president emphasized that the US must monitor and include in all forecasts certain historical trends that are changing the environment. First, to lead with purpose the US must maintain a strong and growing economy and prioritize efforts to combat climate change. Second, to lead with all the instruments of US power, the military will be used as an essential leverage to diplomacy and the other instruments of national power. Finally, to lead with a long-term perspective; the US must recognize that there is a dynamic power shift attributed to the global economy, that technology is shifting power under and far from nation-states and there is a growing trend toward technological innovation and diffusion (Joint Chiefs of Staff 2015).

The 2015 NMS provides the military's priorities: defend the homeland, maintain global security, project power and win in war when deterrence fails. Those priorities will allow the military to protect enduring national and security interests. Also, it provides three key factors, globalization, diffusion of technology and demographic shifts in the strategic environment, which provide opportunities, risks and threats for military operations (Joint Chiefs of Staff 2015).

From the NSS and the NMS priorities, there are four specific aspects that are vital to the foundation for military decisions because they affect, in many ways, all military actions, decisions and plans. Those aspects are: "economy, society, technology and environment." However, this research identifies four distinctive variables from those broad aspects to create the relations among the different groups in the model from an

input, output and outcomes measurement methodology. The variables are “Technology Advancement, Debt Servicing, Social Spending and Climate Change”. These are considered the most prevalent, constant and impactful from the future national and military budget to military decisions and actions.

### Technology

Technology is defined as a “manner of accomplishing a ‘task’ especially using technical processes, methods, or knowledge” (Merriam-Webster Dictionary 2016).

“Task” must be defined as to understand the relation between technology and GDP. A task is a set of activities creating outputs. Outputs are defined as either goods or services (Acemoglu and Autor 2010, 4). When tasks that can be executed by humans are replaced by technology, it can expedite and grow production of services and goods which raise and affect the total productivity in the GDP. But, the introduction of technology creates undesired affects like unemployment in certain municipal and business sectors.

Technology can or may contribute to ecological problems like pollution or privacy issues like identity theft. (Mansfield, Mettler, and Packard 1980). Technological changes and innovations have introduced a technology revolution or advancement in history.

The technology revolution has, is and will continue to change and advance humankind. Technologies continue to be introduced and improve each other in mixture or fusion and diffusion (Schwab 2016). The combination or mixture and sharing of technologies to create new ones can be very detrimental to the military because they can create challenges like new military threats, drones carrying nuclear weapons and

opportunities such as the ability to integrate air and missile defense systems around the world from different radar locations.

The three indicators selected are characteristics that could provide constant and quantifiable data quarterly or annually on technology progress. Since they contribute to productivity, they also impact both the size of the pie (federal budget) and percentage of the pie (the military budget). Those indicators are: (1) Technology growth or innovation, (2) Research and Development investment and (3) Patents awarded.

### Technology Growth or Innovation

Technology advancement or growth can be considered both positive and negative for the national and military budget. Technological changes evolve through invention, innovation and diffusion then create technology growth. Invention is when a new technology is discovered or improved, then innovation allows the technology to be commercialized and have economic value. Finally, diffusion happens when the technology is transferred to other entities for use (Lipsey, Carlaw, and Bekar 2005). Since technology is essential to productivity, an increase in technology will increase productivity boost, the economy and increase the GDP per capita (Galama and Hosek 2008). Hence, total factor productivity (TFP) is used as a measure of technological change because it is a production function that measures the relationship between inputs and outputs from the use of technology (Lipsey and Carlaw 2004). Technology growth enables higher productivity and, therefore, increases the GDP which allows the government to have more revenue from taxes for government spending. But, more technology can increase unemployment in specific skills or tasks and pollution in an area

which will force the government to spend more on social spending. From a military perspective, growth in technology creates new capabilities for military operations, but at the same time new threats will emerge from technology diffusion and innovation.

### Research and Development Investment

Research and Development are input activities for technology growth and advancement. Research is conducted to attain new knowledge or information, where development is to generate products from the new acquired knowledge. Those activities can include basic research aimed at acquiring knowledge for no commercial purpose, applied research aimed at generating a monetary profit and development that transforms research into practice. The Organization for Economic Co-operation and Development (OECD) maintains data and information to track countries investment in Research and Development (Mansfield, Mettler, and Packard 1980). Research and Development is the process to move from technological invention to innovation.

### Patents Awarded

Patents are a legal document approved by a government that permits a creator to manufacture, use, or sell an invention for a set period (Dictionary.com 2017). Patents can be considered crude outputs for technology growth or innovation because they show the final work and products created from Research and Development and inventions. Since books or publications are published with the introduction of new technologies and patents contribute to the number of books published in a specific technological field, then patents can be used as a measure of technology growth and innovation (Comin and Mestieri 2013).



## Debt Servicing

Debt servicing refers to actions taken to repay the principal or to pay the interest accrued by any borrowed funds (CBO 2016). The government can act to service the national debt in two ways:

1. Pay the interest accrued on the national debt which increases the deficit, or
2. Pay down the principal debt if there is a surplus. Both actions will impact the GDP and military budget.

The indicators selected for debt servicing are characteristics that can influence the government to reduce deficits and national debt. The Congressional Budget Office (CBO) maintains constant data on the national debt, spending and revenues. The indicators are: (1) national deficit, (2) net interest cost and (3) social attitudes toward debt servicing.

### Deficit

National deficits exist when government total spending or outlays for a fiscal year exceed the total revenues or receipts (CBO 2016). Deficits show a sign of fiscal unsustainability and a fragile economy. CBO has projected the deficit to continue to rise for the next 30 years (see figure 10). The deficit will increase the national debt which, in turn, increases the cost of interest that the government pays to service the debt. Paying the interest on the debt will initiate pressure on the other parts of the budget to include discretionary spending.

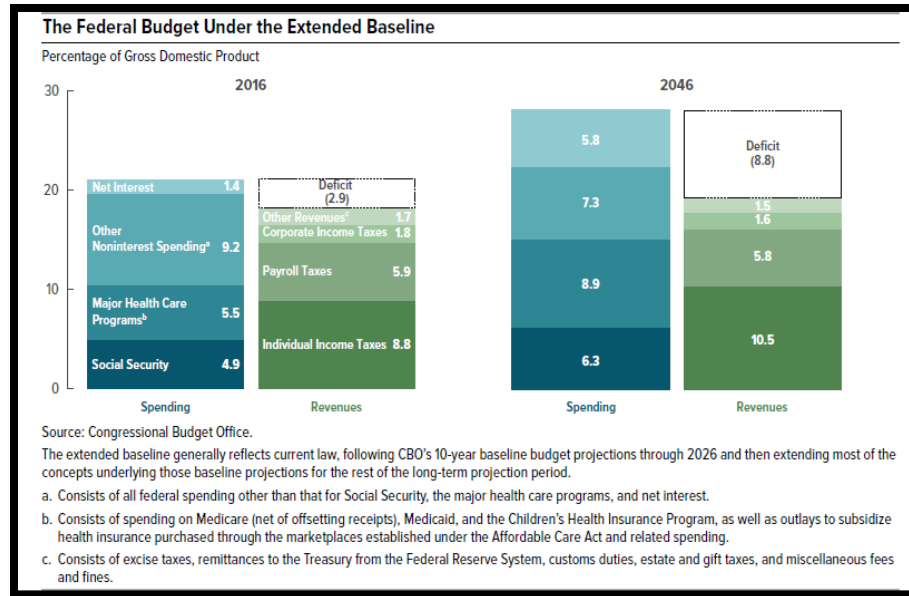


Figure 10. The Federal Budget with Deficit Growth from 2016-2046

Source: Congressional Budget Office (CBO), "CBO Glossary," accessed December 30, 2016, <https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/42904-CBOGlossary.pdf>.

### Net Interest Cost

In the federal budget, net interest cost is the government's payment on the total debt held by the public. CBO has projected the net interest cost to double in the next 10 years. Net interest cost will continue to grow because re-occurring deficits will add to the total debt which will force the government to pay more interest on it (Harris, 2016) (see figures 11, 12, and 13). To reduce the net interest cost, the total debt must be decreased with a revenue surplus or spending cuts. Both options will put pressure on the military budget. Paying less interest will allow more funds to be available for other parts of the budget.

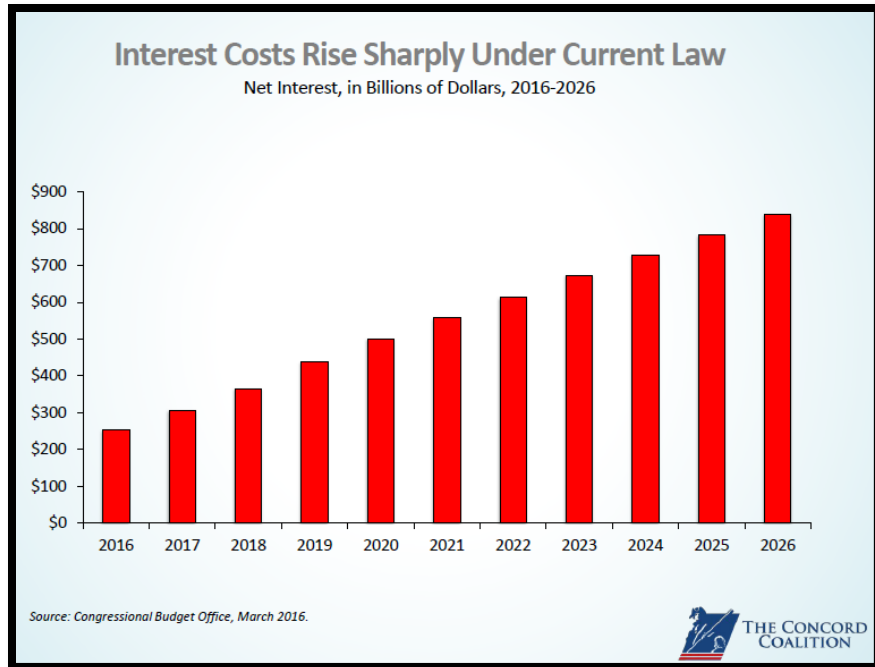


Figure 11. Future Interest Rate Cost

Source: The Concord Coalition, “Federal Budget Pie Charts,” accessed April 13, 2017, <http://www.concordcoalition.org/issues/indicators/federal-budget-pie-charts>.

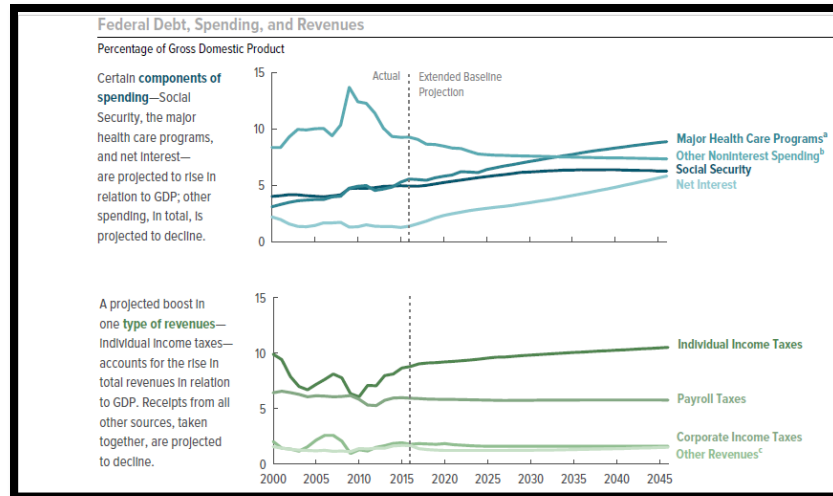


Figure 12. Net Interest Growth as a Percentage of Gross Domestic Product

Source: Congressional Budget Office (CBO), “CBO Glossary,” accessed December 30, 2016, <https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/42904-CBOGlossary.pdf>.

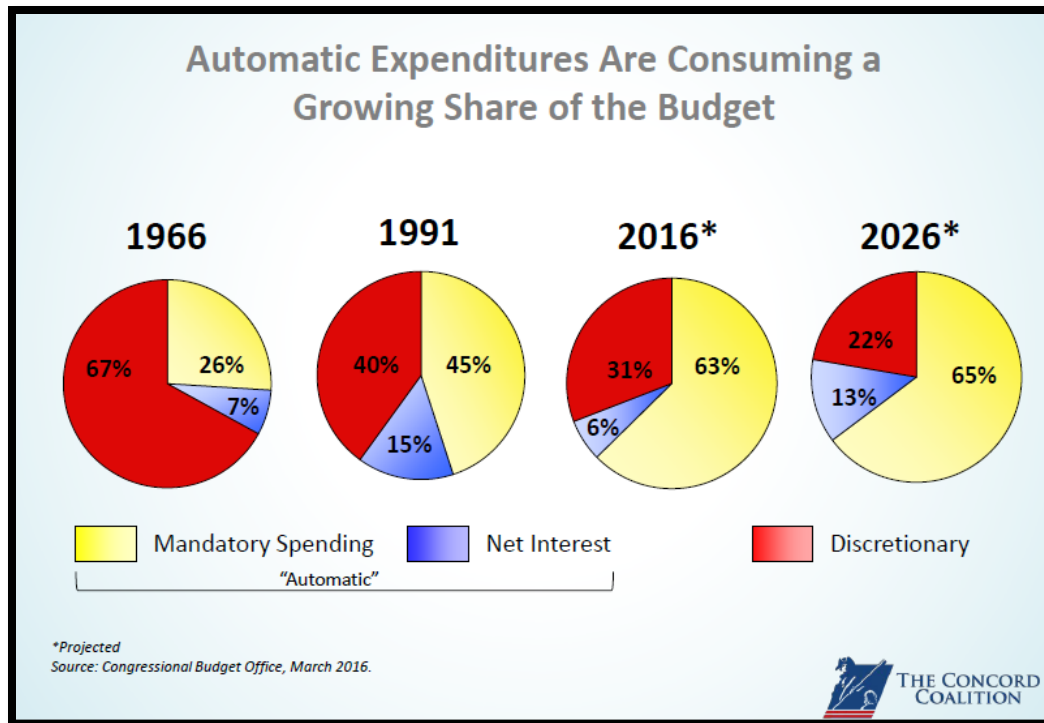


Figure 13. Discretionary Spending will Decrease Over Time

Source: The Concord Coalition, “Federal Budget Pie Charts,” accessed April 13, 2017, <http://www.concordcoalition.org/issues/indicators/federal-budget-pie-charts>.

### Social Attitudes toward Debt Servicing

Social attitudes can be defined as the way people respond or identify with social aspects in their environment (Reference 2017). The social attitude of the American people will play a big role in the inclination of the government to take measures to service the national debt and balance the federal budget. The Pew Research Center, a nonpartisan factual think-tank created in 2004, conducted research to educate the American community on public opinions, demographic changes and other data-driven social science research (Pew Research Center 2017). Pew reported that the attitude of the

American public is changing in that people do not want any more increases to federal spending but favor payment in social spending like unemployment benefits. They want states to be more responsible with their budget and fix problems without federal government intervention. But they have mixed feelings about reducing deficits and government spending. They support decreases in federal government spending, particularly in education, but support state's spending (Pew Research Center 2011).

**Fewer Say Spend More, But Most Cuts Find Little Favor**

Would you increase, decrease or keep spending the same for...		2009 2011 Change		
		%	%	
Education	Increase	67	62	-5
	Decrease	6	11	+5
Veterans' benefits and services	Increase	63	51	-12
	Decrease	2	6	+4
Health care	Increase	61	41	-20
	Decrease	10	24	+14
Medicare	Increase	53	40	-13
	Decrease	6	12	+6
Combating crime	Increase	45	39	-6
	Decrease	10	18	+8
Energy	Increase	41	36	-5
	Decrease	15	23	+8
Scientific research	Increase	39	36	-3
	Decrease	14	23	+9
Environmental protection	Increase	43	36	-7
	Decrease	16	26	+10
U.S. anti-terrorism defenses	Increase	35	33	-2
	Decrease	17	21	+4
Agriculture	Increase	35	32	-3
	Decrease	12	23	+11
Military defense	Increase	40	31	-9
	Decrease	18	30	+12
Unemployment assistance	Increase	44	27	-17
	Decrease	15	28	+13
Global poverty assistance	Increase	26	21	-5
	Decrease	34	45	+11

PEW RESEARCH CENTER Feb. 2-7, 2011. Percent saying "keep spending the same" not shown.

Figure 14. Change in Attitudes toward Government Spending

Source: Pew Research Center, *Changing Views of Federal Spending: Fewer Want Spending to Grow, but Most Cuts Remain Unpopular* (Washington, DC: Pew Research Center for the People and the Press, 2011).

No Consensus that Deficit Reduction is the Priority			
Federal government's priority these days should be...	June 2009 %	Feb 2010 %	Feb 2011 %
Reducing the budget deficit	46	47	49
Spending (more) to help the economy recover*	48	47	46
Don't know	6	6	5
	100	100	100

PEW RESEARCH CENTER Feb. 2-7, 2011. Q18.  
 \* In 2009 and 2010 option was "Spending more to help the economy recover."

Figure 15. Federal Government Priority

Source: Pew Research Center, *Changing Views of Federal Spending: Fewer Want Spending to Grow, but Most Cuts Remain Unpopular* (Washington, DC: Pew Research Center for the People and the Press, 2011).

Support for Decreased Spending - Education a Notable Exception				
Would you increase, decrease or keep spending the same for...	2009 %	2011 %	Change	
Education	Increase	67	62	-5
	Decrease	6	11	+5
	Keep same	23	25	+2
Veterans' benefits and services	Increase	63	51	-12
	Decrease	2	6	+4
	Keep same	29	40	+11
Health care	Increase	61	41	-20
	Decrease	10	24	+14
	Keep same	24	30	+6
Medicare	Increase	53	40	-13
	Decrease	6	12	+6
	Keep same	37	43	+6
Combating crime	Increase	45	39	-6
	Decrease	10	18	+8
	Keep same	39	40	+1
Energy	Increase	41	36	-5
	Decrease	15	23	+8
	Keep same	35	37	+2
Scientific research	Increase	39	36	-3
	Decrease	14	23	+9
	Keep same	40	37	-3
Environmental protection	Increase	43	36	-7
	Decrease	16	26	+10
	Keep same	34	36	+2
U.S. anti-terrorism defenses	Increase	35	33	-2
	Decrease	17	21	+4
	Keep same	41	43	+2
Agriculture	Increase	35	32	-3
	Decrease	12	23	+11
	Keep same	41	39	-2
Military defense	Increase	40	31	-9
	Decrease	18	30	+12
	Keep same	37	36	-1
Unemployment assistance	Increase	44	27	-17
	Decrease	15	28	+13
	Keep same	36	41	+5
Aid to the world's needy	Increase	26	21	-5
	Decrease	34	45	+11
	Keep same	33	29	-4

PEW RESEARCH CENTER Feb. 2-7, 2011. Q17a-c.

Figure 16. Support for Decreasing Government Spending

Source: Pew Research Center, *Changing Views of Federal Spending: Fewer Want Spending to Grow, but Most Cuts Remain Unpopular* (Washington, DC: Pew Research Center for the People and the Press, 2011).

The figure above shows that the generation called the millennials, is ambivalent about government spending, but want fiscal sustainability to be a focus of the administration in the future.

### Social Spending

The OECD, which promotes economic policies worldwide, defines social expenditure or spending as: “comprises of, cash benefits, direct in-kind provision of goods and services, and tax breaks with social purposes”. Benefits may be targeted at low-income households, the elderly, disabled, sick, unemployed, or young persons (OECD 2016).

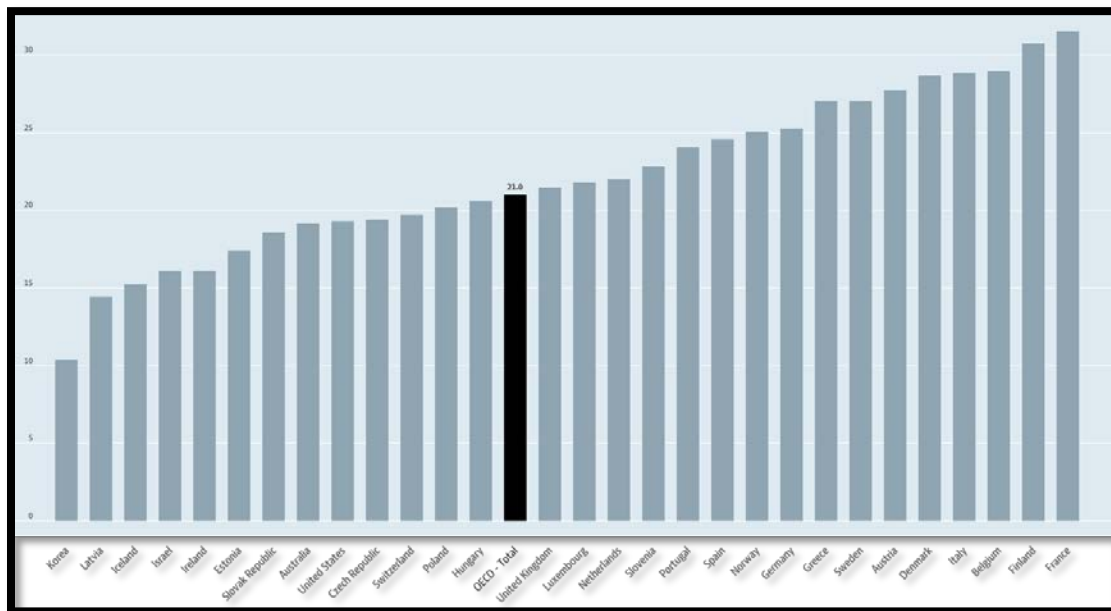


Figure 17. Social Spending per Nation

Source: Organization for Economic Co-operation and Development, “Social and Welfare Issues, Social Expenditure Database (SOCX),” 2016, accessed April 13, 2017, <http://www.oecd.org/social/expenditure.htm>.



Social spending in the US is the “entitlement” programs that comprise the “mandatory” section in the federal budget. Social spending, or mandatory programs, compete directly with discretionary programs which is dominated by military spending. Therefore, an increase in social spending without raising the national debt can decrease future military spending (CBO 2016).

The indicators selected for social spending are characteristics that indicate the government focuses to provide more or better social programs to the people and, therefore, could reduce the size of the pie (federal budget) and the percentage of the pie (military budget). They can be tracked from the CBO reports for constant monitoring. The indicators are: (1) entitlement spending, (2) demographic changes and (3) individual empowerment.

### Entitlement Spending

David Koitz (2012), in his book, *Entitlement Spending: Our Coming Fiscal Tsunami*, addresses the inevitable problem that the American people will continue to face in the upcoming years. He also provides some options to deal with the issue sooner rather than later. Entitlement programs are part of the government’s mandatory spending that generally provide support to individuals. The well-known ones are Medicare, Medicaid, Social Security and unemployment benefits. These entitlement programs are not subject to annual authorizations like discretionary spending; they must be paid to anyone that is eligible for them at that time. Therefore, many factors make entitlement spending the costliest within the federal budget. Mandatory spending represented 38 percent of the budget in 1972, 56 percent in 2012 and 65 percent in 2016 and will continue to rise (CBO

2016). Another factor that contributes to entitlement spending are demographic changes in society.

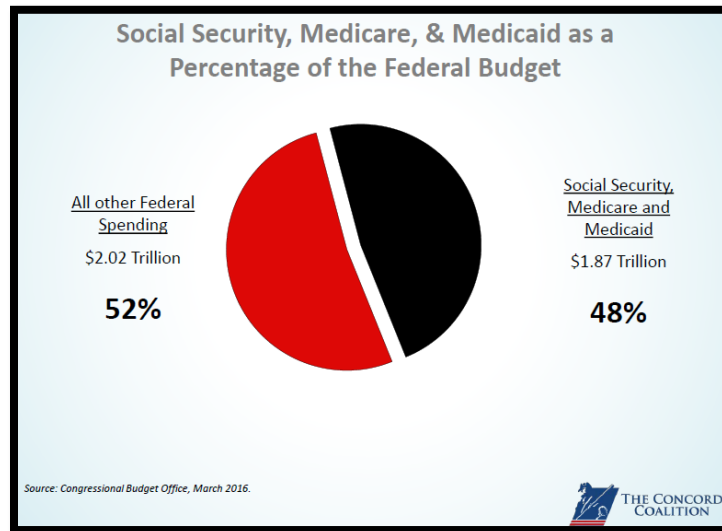


Figure 18. Social and Entitlement Spending in the Federal Budget

Source: The Concord Coalition, “Federal Budget Pie Charts,” accessed April 13, 2017, <http://www.concordcoalition.org/issues/indicators/federal-budget-pie-charts>.

### Demographic Changes

Demographic changes are any cultural or social variances in a society’s population. The demographics of a society can represent data for age, gender, sex, race or labor force participation. From the CBO, as a factor of social spending, the demographic changes that are relevant for this research are:

1. The size and composition of the US population, in coming decades, which will affect federal tax revenues and spending as well as the overall performance of the

economy. For example, the increase in life expectancy of the baby boomer generation will result in an increase in entitlement spending.

2. Demographic changes that will influence the size of the labor force and the number of beneficiaries of such federal programs as Medicare and Social Security. For example, less of the population will be available to work due to the aging of the population from the baby boomer generation (CBO 2016).

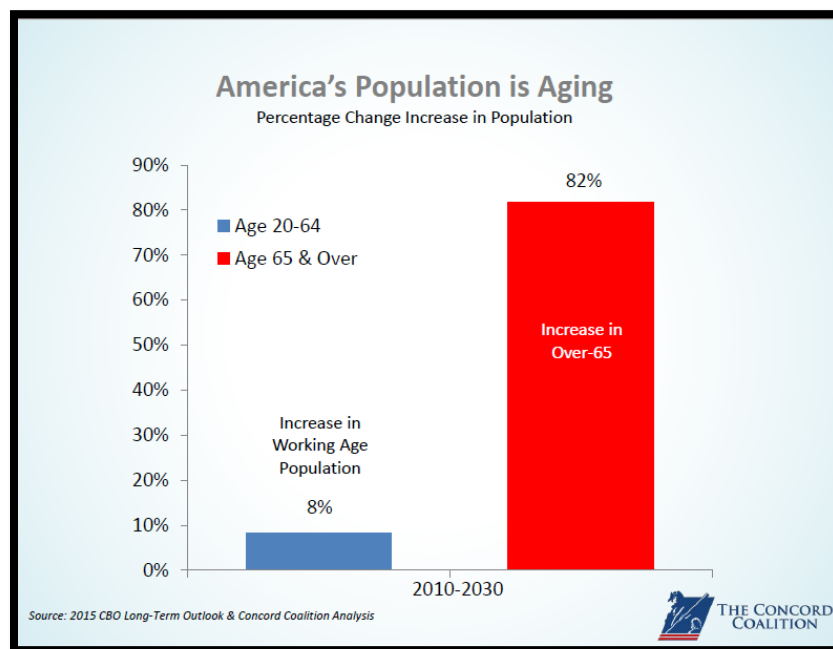


Figure 19. Working Age vs. Elderly Population from 2010-2030

Source: The Concord Coalition, "Federal Budget Pie Charts," accessed April 13, 2017, <http://www.concordcoalition.org/issues/indicators/federal-budget-pie-charts>.

## Individual Empowerment

Empowerment can have many connotations in different contexts. For this research empowerment is defined as methods used to enhance an individual's or group's capacity to make choices and to translate those choices into effective outcomes (Alsop and Heinsohn 2005). As an indicator for social spending, empowerment can be a cause and effect at the same time. For example, when more individuals are educated, they will use social media and the internet to make choices. At the same time, when access to social media and the internet become more and more accessible, more people will want to get educated and informed about their choices. Therefore, individual empowerment will allow more people to make individual choices by voting for policy makers that share their views. To measure individual empowerment the United Nations Development Programme (UNDP) uses the Human Development Index (HDI) to rate countries using a combination of three dimensions: health, education and living standards. The three dimensions have specific instruments of measure associated with them. The instruments are: for health, life expectancy at birth; for education, means and expected years of schooling; and, for living standards, gross national income per capita. In 2014, the UNDP reported that the United States ranked 8th in the world and was growing. (Graf et al. 2015) (see tables 1 and 2).

Table 1. Human Development Index Ranking

Table 1: Human Development Index and its components								
		Human Development Index (HDI)	Life expectancy at birth	Expected years of schooling	Mean years of schooling	Gross national income (GNI) per capita	GNI per capita rank minus HDI rank	
HDI rank	Country	Value	(years)	(years)	(years)	(2011 PPP \$)		
		2014	2014	2014	<sup>a</sup>	2014	<sup>a</sup>	2014
VERY HIGH HUMAN DEVELOPMENT								
1	Norway	0.944	81.6	17.5	12.6	<sup>b</sup> 64,992		5
2	Australia	0.935	82.4	20.2	<sup>c</sup> 13.0	42,261		17
3	Switzerland	0.930	83.0	15.8	12.8	56,431		6
4	Denmark	0.923	80.2	18.7	<sup>c</sup> 12.7	44,025		11
5	Netherlands	0.922	81.6	17.9	11.9	45,435		9
6	Germany	0.916	80.9	16.5	13.1	<sup>d</sup> 43,919		11
6	Ireland	0.916	80.9	18.6	<sup>c</sup> 12.2	<sup>e</sup> 39,568		16
8	United States	0.915	79.1	16.5	12.9	52,947		3
9	Canada	0.913	82.0	15.9	13.0	42,155		11
9	New Zealand	0.913	81.8	19.2	<sup>c</sup> 12.5	<sup>b</sup> 32,689		23
11	Singapore	0.912	83.0	15.4	<sup>f</sup> 10.6	<sup>e</sup> 76,628	<sup>g</sup>	-7

Source: United Nations Development Programme, “Human Development Reports,” 2016, accessed April 15, 2017, <http://hdr.undp.org/en/composite/HDI>.

Table 2. Trends in Human Development Index 1990-2014

Table 2: Trends in the Human Development Index, 1990-2014														
		Human Development Index (HDI)							HDI rank		Average annual HDI growth			
HDI rank	Country	Value							Change		(%)			
		1990	2000	2010	2011	2012	2013	2014	2013	2009–2014 <sup>a</sup>	1990–2000	2000–2010	2010–2014	1990–2014
VERY HIGH HUMAN DEVELOPMENT														
1	Norway	0.849	0.917	0.940	0.941	0.942	0.942	0.944	1	0	0.77	0.25	0.11	0.44
2	Australia	0.865	0.898	0.927	0.930	0.932	0.933	0.935	2	0	0.36	0.33	0.20	0.32
3	Switzerland	0.831	0.888	0.924	0.925	0.927	0.928	0.930	3	0	0.67	0.40	0.14	0.47
4	Denmark	0.799	0.862	0.908	0.920	0.921	0.923	0.923	4	1	0.76	0.53	0.41	0.61
5	Netherlands	0.829	0.877	0.909	0.919	0.920	0.920	0.922	5	0	0.56	0.36	0.34	0.44
6	Germany	0.801	0.855	0.906	0.911	0.915	0.915	0.916	6	3	0.66	0.58	0.26	0.56
6	Ireland	0.770	0.861	0.908	0.909	0.910	0.912	0.916	8	-2	1.12	0.54	0.21	0.72
8	United States	0.859	0.883	0.909	0.911	0.912	0.913	0.915	7	-3	0.28	0.28	0.18	0.26
9	Canada	0.849	0.867	0.903	0.909	0.910	0.912	0.913	8	1	0.22	0.41	0.28	0.31
9	New Zealand	0.820	0.874	0.905	0.907	0.909	0.911	0.913	10	-1	0.64	0.35	0.24	0.45

Source: United Nations Development Programme, “Human Development Reports,” 2016, accessed April 15, 2017, <http://hdr.undp.org/en/composite/HDI>.

The figures above could be interpreted as an indication that American society is becoming more educated, healthier and will favor more individualistic tendencies. Those tendencies will allow the citizens to challenge government decisions by emphasizing individual empowerment.

### Climate Change

According to the US Environmental Protection Agency (EPA), climate change refers to any significant change in the measures of climate lasting for an extended period. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer (EPA 2016). In this research, climate change is considered constant, predictable and trackable. Therefore, climate change impacts on the GDP, military budget and operations must be monitored in any future scenarios. Climate change exists and certain aspects of natural occurrences can be tracked to show the impact on all aspects of life on the planet. For example, the current level of carbon dioxide in the atmosphere combine with extreme and frequent droughts or flooding in America would reduce food and water production creating turmoil in terms of population growth and results in the development of conflicts among social groups and generate population concentration. All those would impact the national military budget and the ability to project power worldwide.

The three indicators selected for climate change are characteristics that show changes in the global environment that can contribute to unstable weather. Those changes will force the government to react with spending that competes with military funding.

The three indicators for climate change are: (1) Greenhouse gas concentration, (2) Global warming and (3) Glacier melt.

### Greenhouse Gas Concentration

To understand the problem with greenhouse gas concentration requires defining it. The greenhouse effect is the process of thermal radiation emitted by the land and ocean, that is absorbed by the atmosphere, including clouds and radiated back towards the earth's surface (see figure 20). The intergovernmental Panel on Climate Change reported in 2014 that anthropogenic emission of greenhouse gas in our atmosphere has been the highest in history and trends have shown a continuous growth (IPCC, 2014) (see figure 21). Those emissions are the primary cause for subsequent climate changes on earth. To combat those problems the government must create regulation to counter adverse and illegal emissions or increase spending to invest in actions that reverse the problem caused by greenhouse gas emission. This spending will compete with military funding as part of discretionary spending.

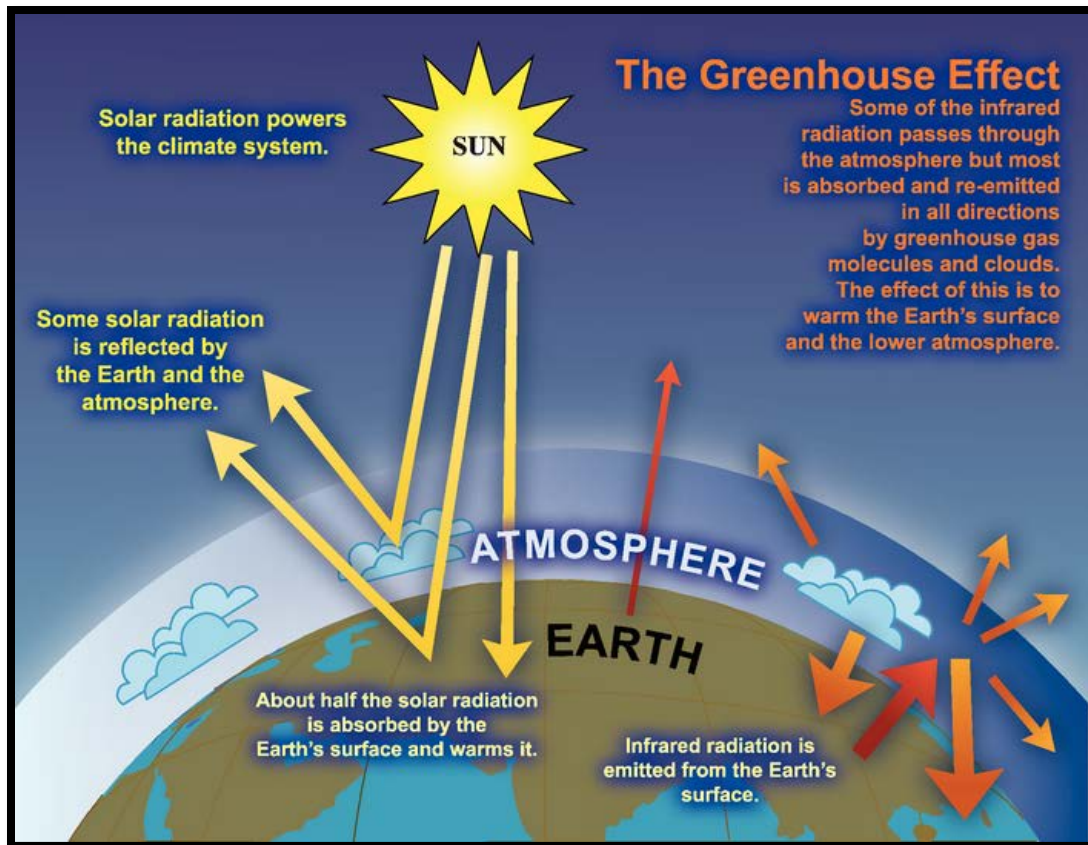


Figure 20. Greenhouse Effects

Source: Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2014: Synthesis Report* (Genève: IPCC, 2014).



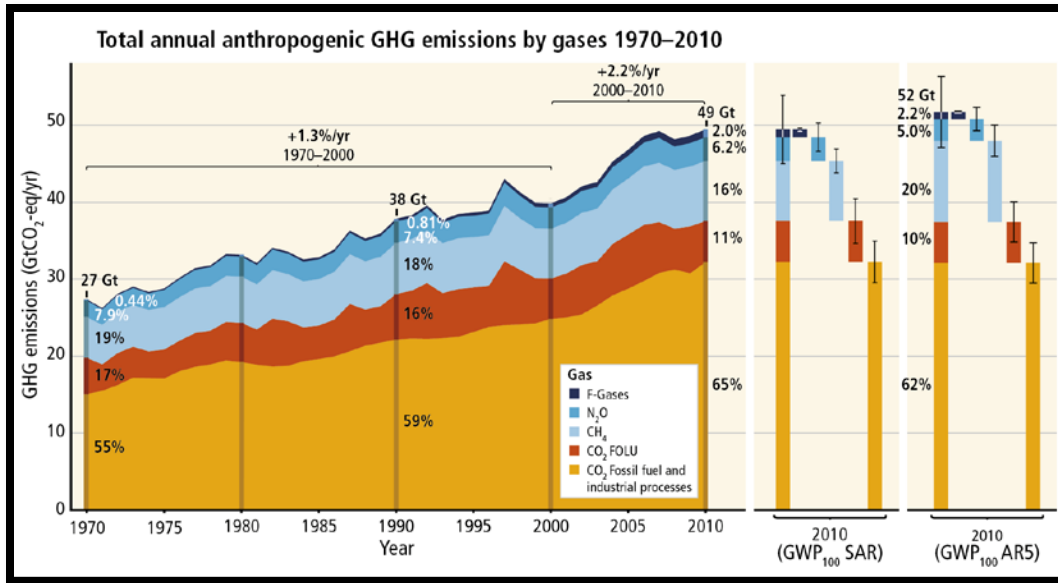


Figure 21. Total Annual Anthropogenic GHG Emission by Gases 1970-2010

Source: Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2014: Synthesis Report* (Genève: IPCC, 2014).

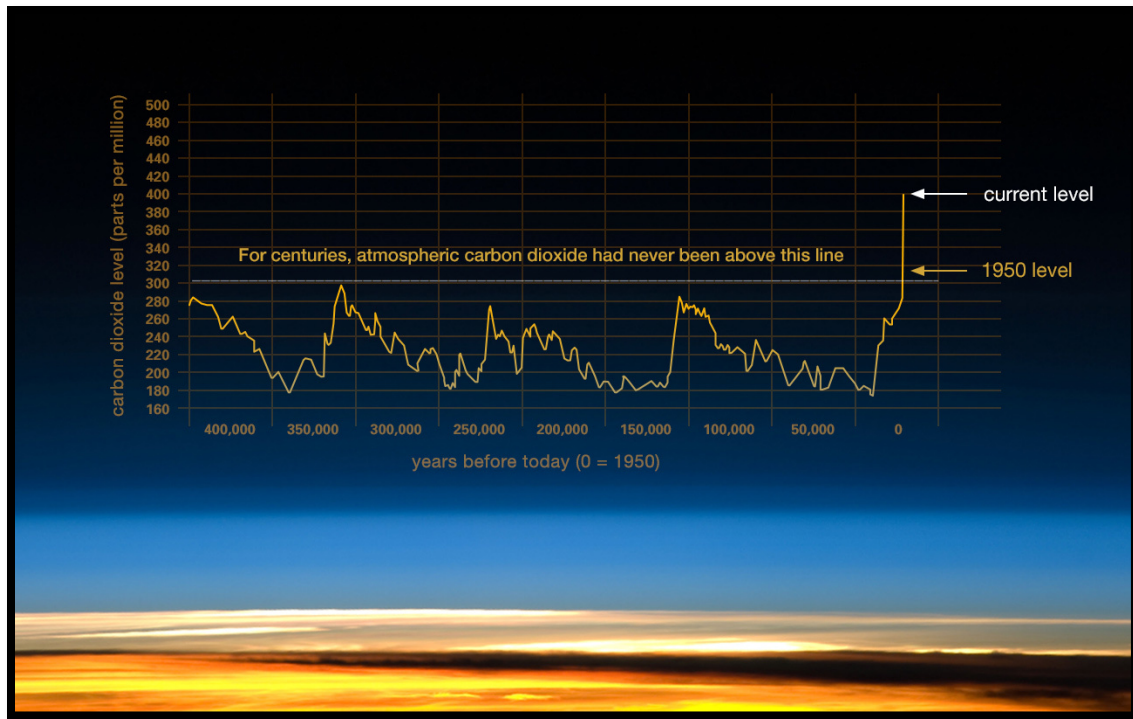


Figure 22. Level of Carbon Dioxide in the Atmosphere

Source: S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor, and H. L. Miller, eds., *Climate Change 2007: The Physical Science Basis Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press, 2007).

### Global Warming

Global warming is defined as an average increase of 2-degree Celsius in temperature from pre-industrial levels (Mearns and Norton 2010). Due to human activities on earth, mainly the burning of fossil fuels that produce the emission of greenhouse gases in the industrial era, the heat in the atmosphere continues to rise and creates variations in nature. Temperature rise contributes to the number of hurricanes in the US. CBO has estimated that the cost to hurricane damages will rise from the current

0.10 (\$18 billions) to 0.13 (\$24 billions) percent of GDP if the current conditions remain stable. However, if the temperature continues to rise at a faster rate, then more hurricane occurrences can be attributed to the rise of sea levels which will lead to more damaging storms (CBO 2016). More hurricanes will trigger more spending to repair damages which could put more stress on military budgets as a percentage of the overall budget.

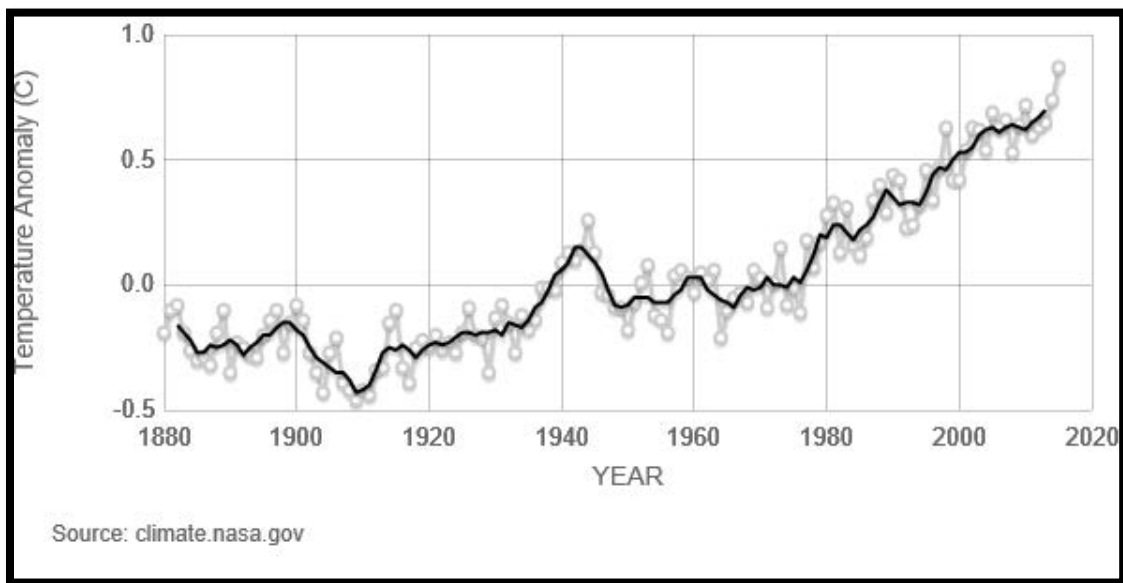


Figure 23. Temperature Anomaly

Source: NASA, “Global Climate Change: Vital Signs of the Planet,” accessed October 16, 2016, <https://climate.nasa.gov/>.

### Glacier Melt

Heat in the atmosphere created by the emission of greenhouse gas will cause the ice sheets in Greenland and Antarctica to melt at a faster rate and cause oceans to enlarge and the sea levels to rise. Both continents’ ice composition has been reduced at an

extreme pace (see figures 11 and 12). Coastal and gulf coast development will be reduced and the rise of sea levels will contribute to extensive construction measures to mitigate rising water levels. The CBO has estimated that coastal development will increase from the current \$30 to \$70 billion in 2075. This phenomenon would put stress on the discretionary budget.

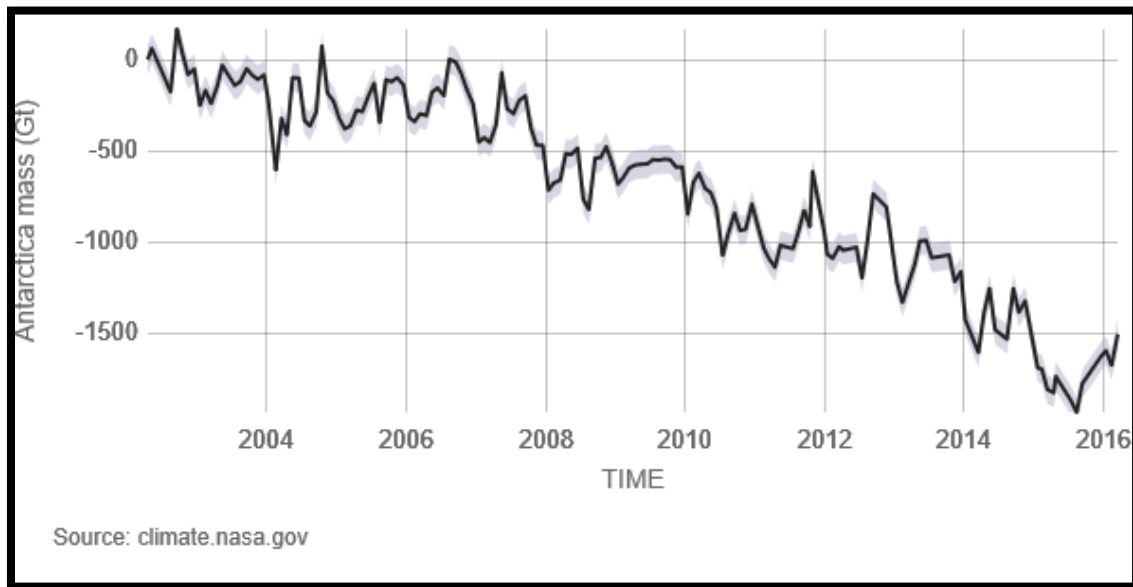


Figure 24. Antarctica Ice Mass Decrease

Source: NASA, “Global Climate Change: Vital Signs of the Planet,” accessed October 16, 2016, <https://climate.nasa.gov/>.

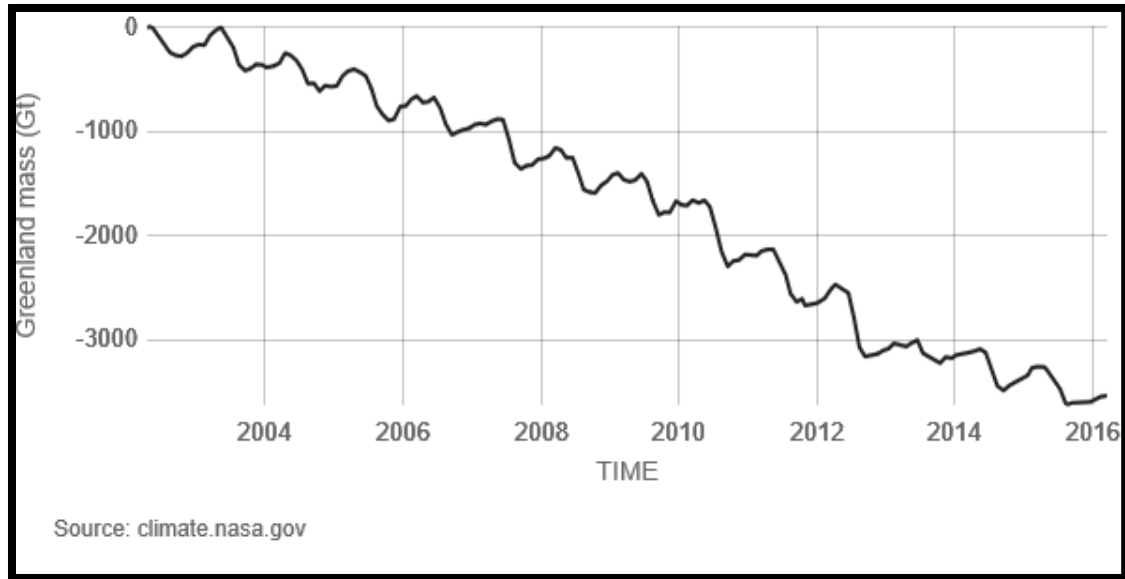


Figure 25. Greenland Ice Mass Decrease

Source: NASA, “Global Climate Change: Vital Signs of the Planet,” accessed October 16, 2016, <https://climate.nasa.gov/>.

### Scenarios and Strategic Posture

Each scenario is the product of all variables that affect both the federal and military budgets combined to represent a future state of nature. Military decision makers must adopt a strategic posture to match the opportunities and challenges presented by the states of nature on a worldwide scale. We identify each scenario that is appropriate to the correct strategic posture and identify the current indicators and variables that will lead to that state of nature in the future.

#### Scenario A—Global Policeman

In this scenario, the US adopts a Global Hegemon posture because it has attained the objectives set forth in the NMS. The US military has unmatched capabilities such as

rapidly deployable sealift ships that allow it to project power anytime, anywhere on the globe with maximum capabilities and force to achieve complete dominance during conflict. Overseas and forward stationing are established in many regions to demonstrate commitment or conduct show-of-force and control. This is the best scenario, but requires a lot of investment and funds to be executed. What would be the possible indicators and variables for this scenario?

#### Scenario B—Strong Alliance and Coalition

In scenario B, the US adopts a competing superpower posture, accepting equality among other superpowers that need to share the burden of power with allies. The US military has capabilities to deploy forces in order to be part of a coalition to project power anytime, anywhere on the globe in a supporting role to achieve success during conflict. Overseas and forward basing are established in specific regions to demonstrate commitment and support. This is the most likely scenario, but requires investments and funds to be executed. What would be the possible indicators and variables for scenario B?

#### Scenario C—Partnership

In scenario C, the United States adopts a regional power posture, maintaining a regional presence and focus on close alliances and coalition in a region like the Western Hemisphere or North America. The US decides not to compete with other superpowers outside the boundaries of the region it delineates. The US military has capabilities to deploy forces to project power within its regional posture to achieve success during conflict or maintain order. Overseas and forward bases are established within this region to demonstrate a show of force. This is the second least likely scenario, but requires

investment and funds to be executed. What would be the possible indicators and variables for scenario C?

#### Scenario D—America First

In scenario D, the United States adopts a homeland defense posture because of economic constraints, reduced military forces and capability decrease. The objectives set in the NMS would dictate a focus on conducting operations within the national boundaries. The US military has minimum capabilities for deployment and will not project power anywhere on the globe. This is the least desirable scenario, but requires the least investment and funds to be executed. What are the possible indicators and variables for this scenario?

#### Modeling

Predictive models use tangibles and computations to correctly predict future results or states of nature. On the other hand, “Descriptive models” use relationships between their variables to deduce the relative outcomes or future states. The model described is a descriptive model because it requires a constant track of empirical data to formulate possible states of nature with corresponding strategic postures. “System dynamics models” has time as the main driving force behind all decisions (Woods 2008). Systems dynamics help understanding the interrelation and interdependency between the elements of a system and how outside influence or policy can affect the system. This model can be considered a system dynamic because the inputs, which are indicators of economic, social and environmental trends at a start point, can be forecasted and analyzed from beliefs and views. They produce the output of the system, which is future

strategic posture at different time intervals (Ossimitz and Mrotzek 2008). “The Pareto Principle” is an observation not a law. It recognizes the vast disproportion among output variables. By using the Pareto Principle during the development and testing of the model, focus was emphasized on the indicators, variables, drivers and resources that are important to eliminate insignificant ones. For that reason, at this development stage of the model, we focused on three indicators for each of the four variables that affect two drivers in our model (Betterexplained.com 2016).



## CHAPTER 3

### RESEARCH METHODOLOGY

This research investigates a qualitative model with quantifiable variables and proposes scenarios as alternate futures to understand the complexity of the social and economic environment surrounding military decision makers while choosing the right strategy in the present to support future states of nature. Therefore, this is an Applied Professional research case study because it is addressing an existing issue within the formulation of strategy to support future states of nature. Special topics were selected, steps were taken to analyze, define and produce the findings from the case study (Hancock and Algozzine 2011).

As described by Long (2015) case studies are a useful method for conducting qualitative research for problem areas that are human-centric, dynamic, volatile and contain a mix of stakeholders, interests, variables and information concepts that demand a deep understanding of context in order to produce informed policy choices.

The goal of this research is to inform military policymakers about the complexity associated with making strategic decisions coupled with economic factors. The model was created with relevant and up-to-date data that encompasses economic variables with indicators that affect budgetary decisions. The model generated broad theoretical knowledge that has a wide applicability beyond the boundaries of the systems included in it. This case study looks at how different types of information and associated methods of gathering and analyzing data can be mixed to create a profound application of the model (Long 2015).

A conceptual framework, qualitative and quantitative research methods were used during this research. This chapter explains the methods, approaches, concepts, and reasoning used to set the model, evaluate the variables and drivers and create the scenarios.

### Instruments of Measures

Specific investigations were conducted to establish appropriate relationships between the elements of the model. First, quantitative analysis was applied to all budgetary findings and GDP to provide future estimated budget dollar figures to apply for strategic decisions. Second, qualitative analysis was conducted to apply judgement to the various sources consulted to create the relationship between the elements of the model. To measure the drivers in the model, criteria were established for the selection of the variables. Variables were selected based on acceptability, suitability, predictability of occurrence and level of impact on the drivers. The indicators were chosen from criteria of performance measures through a Balanced Scorecard approach.

### Data Collection

Tables and charts were created to:

1. Compare side-by-side the different parts of the federal budget relevant to this research and
2. Depict the estimated dollar values for future budgets, 2016 to 2021. Matrices were created to illustrate how the indicators were selected from others to support the drivers and to establish numeric weighted values to the drivers and indicators to forecast different scenarios in the model.

### Conceptual Framework

A conceptual framework using the case study research method was used to frame the model with drivers, variables, indicators, the national and military budgets to produce scenarios with corresponding strategic postures. The conceptual framework provides a visualization of the thinking process after understanding the different sections and elements in the model (Hancock and Algozzine 2011).

### Qualitative Research

There is already policy put in place to reduce the national deficit, thereby reducing the amount of funds available to support the national and military budgets. Qualitative methodology was used to research different sources to select drivers, variables and indicators. This research will provide scenarios for possible futures that need to be addressed regarding the military's capability in alternative strategies. The scenarios are a mix of specific variables from the four main drivers combined with budget decisions and political priorities. The NSS, NMS, and QDR provided priorities from a strategic point of view. The federal budget provided the monetary context for applying those priorities and resources. A Balanced Scorecard approach was used to link indicators to military strategic postures and set the objectives, and parameters for the data to be analyzed for the selection of the variables of each trend. A scenario planning method was used to create the different scenarios with alternate outcomes to help produce recommendations for military strategic postures.

### Quantitative Research

A quantitative method was used to select and evaluate the metric's measures for the drivers, variables and indicators to show their importance and significance to be monitored by decision makers. Data provided factual dollar values to the thought process and reinforced some of the arguments made during the qualitative research. The Office of Management and Budget, the National Priorities Project (NPP), the Heritage Foundation and the Congressional Budget Office provided insights regarding the interaction between the national and military budgets and the GDP. The tables and graphs visually depict portions of the federal budget that impact strategic military policies and postures with a focus on causation effects based on trends and variables.

## CHAPTER 4

### ANALYSIS

The purpose of this chapter is to capture the findings from all the data gathered during the research to answer the primary question: Can a descriptive strategic budgetary planning model be built, using the principles of the Balanced Scorecard and systems dynamics to develop insights into a requirements document for a robust, predictive model so that the military can effectively prioritize its planning and programming to match future capabilities for emerging national military requirements? The following secondary questions in this chapter are answered:

1. What variables affect the federal budget and Gross Domestic Product (GDP) regarding military readiness?
2. What are three reasonable indicators for each variable that could serve as gauges in a blended scorecard model for forecasting budget policy change?
3. What set of indicators are relevant to each variable?
4. Why did certain indicators get selected for inclusion?
5. What does testing the model reveal?

To answer these questions, this chapter will concentrate on explaining the entire model and its parts. It will show the logic of the model and argue its validity. The explicit definition of each term, used in chapter 2, can keep the reader abreast with the model. The indicators were defined and explained in relation to the variables. Also, this chapter explains how the independent variables; Technology, Debt Servicing, Social Spending and Climate Change, affect the two dependent drivers; Gross Domestic Product and the

military budget. The chapter will conclude with the scenarios and corresponding suitable military strategic posture. “A successful model tells you things you didn't tell it to tell you” (Savage 2009, 11).

### Testing the Model

To test the model, we applied many logical and qualitative deductions before using the Monte Carlo simulation in Excel to provide a visual representation of the results. Descriptive, System dynamics, Pareto principle and the forecasting method of decision tree, as explained in chapter 2 were applied to eliminate or identify the flaws in the model's logic or application.

The forecasting method decision tree was used to support the logic of this model. The following were used to create, evaluate and test the model:

Step 1-Defined the funding problem that the military will face while forecasting future states of nature while supporting the correct strategic posture.

Step 2-Gathered and collected historical data corresponding to the variables and indicators.

Step 3-Explored analyses of the data allowed the framing and construction of the model.

Step 4-Chose the model. After setting parameters and weighing the elements of the model, the Monte Carlo simulation was applied.

Step 5-Evaluated the model over time to address its flaws, pros and cons (Makridakis, Wheelwright, and Hyndman 1998).

Furthermore, tables with quantitative and qualitative data were created to analyze and compute the model's elements.

### Qualitative Findings

First, a narrative was developed that defined each variable to maintain consistency and explained why they were weighted differently.

Table 3. Variables Relationship

<b><u>VARIABLES</u></b>	<b><u>DEFINITION</u></b>	<b><u>WEIGHT</u></b>	<b><u>EXPLANATION</u></b>
<b><u>TECHNOLOGY</u></b>	A manner of accomplishing a "task" especially using technical processes, methods, or knowledge"	<b>2</b>	Technology growth will increase GDP, but if spending is not control the growth is irrelevant.
<b><u>SOCIAL SPENDING</u></b>	All the "entitlement" programs that comprised the "m, mandatory" section in the national budget.	<b>4</b>	Entitlement spending as a part of social spending is the #1 cause for increase in social spending, the baby boomer generation will consume a lot more of Medicare, Medicaid and Social Security.
<b><u>DEBT SERVICING</u></b>	Debt servicing refers to actions taken to repay the principal or to pay the interest accrued by any borrowed funds	<b>3</b>	If Fiscal sustainability become the #1 priority that will reduce all discretionary spending.
<b><u>CLIMATE CHANGE</u></b>	Climate change refers to any significant change in the measures of climate lasting for an extended period.	<b>1</b>	Climate change is a threat but is slow and actions can be taking to prorate and counter its effect on spending.

Source: Created by author.

Second, a logical relationship was defined between each variable and two important budgetary questions (BQ). Furthermore, the relationship between the variables is direct or inverse. For example, when a variable (V) increases, the size of the pie will decrease and vice versa.

Table 4. Variables Relationship to Q1 and Q2

VARIABLES RELATIONSHIP TO Q1 and Q2					QUESTION 1	As a result of (X) change in (V) Variable will the size of The Federal Budget Increase or Decrease?
					QUESTION 2	As a result of (X) change in (V) Variable will the % of Military Spending Increase or Decrease?
VARIABLES	QUESTION	CHANGE	FEDERAL BUDGET	MILITARY SPENDING	RELATIONSHIP	REASONNING
TECHNOLOGY	Q1	POSITIVE (+)	INCREASE (+)	INCREASE (+)	DIRECT	Technology is a main driver for productivity and GDP growth.
	Q2	NEGATIVE (-)	DECREASE (-)	DECREASE (-)	DIRECT	
SOCIAL SPENDING	Q1	POSITIVE (+)	DECREASE (-)	DECREASE (-)	INVERSE	Social Spending will continue to increase in the future and put stress on the federal budget.
	Q2	NEGATIVE (-)	INCREASE (+)	INCREASE (+)	INVERSE	
DEBT SERVICING	Q1	POSITIVE (+)	DECREASE (-)	DECREASE (-)	INVERSE	Servicing the federal debt will require budget cuts.
	Q2	NEGATIVE (-)	INCREASE (+)	INCREASE (+)	INVERSE	
CLIMATE CHANGE	Q1	POSITIVE (+)	DECREASE (-)	DECREASE (-)	INVERSE	Climate change is constant and will create stress on federal budget.
	Q2	NEGATIVE (-)	INCREASE (+)	INCREASE (+)	INVERSE	

Source: Created by author.

Then, a description of how each of the three indicators (I) impact or contributes to their own variables (V) and their relationship, as in question 3. It was assumed that the three indicators for each variable have a blended relationship because they will affect their variables continuously and proportionally while contributing to changes to the other variables. For example, a decrease in patents will always be considered as a reduction in technology advancement.



Table 5. Indicators Relationship

VARIABLES with WEIGHT	INDICATORS	DEFINITION	WEIGHT	EXPLANATION
<b>TECHNOLOGY (2)</b>	<b>GROWTH</b>	Technological changes evolve through invention, innovation and diffusion then create technology growth.	<b>2</b>	Technological innovation, invention and diffusion will create more availability to technology.
	<b>R &amp; D</b>	Research is executed to attain new knowledge or information, where development is to generate product from the new acquired knowledge.	<b>3</b>	With more investment in R&D there will be increase in technology.
	<b>PATENTS</b>	Patents are a legal document approved by a government that allow a creator to manufacture, use or sell and invention for a set period.	<b>1</b>	Patents are the final outputs on technology inventions.
<b>SOCIAL SPENDING (4)</b>	<b>ENTITLEMENT SPENDING</b>	Entitlement programs are part of the government mandatory spending they provide support to individual.	<b>3</b>	Entitlement Spending will continue to increase.
	<b>DEMOGRAPHIC CHANGES</b>	Demographic changes are any cultural or social variances in a society population	<b>2</b>	The growth of the babyboomers and reduction in the labor force will create extensive social spending.
	<b>INDIVIDUAL EMPOWERMENT</b>	Empowerment is defined as methods use to enhance an individual's or group's capacity to make choices and to translate those choices into effective outcomes	<b>1</b>	People will request less control from the government and become more voicefull.
<b>DEBT SERVICING (3)</b>	<b>DEFICIT</b>	National deficit exists when the government total spending or outlays for a fiscal year exceed the total revenues or receipts	<b>3</b>	The Deficit is the most important part of the federal Debt growth.
	<b>NET INTEREST COST</b>	Net interest cost is the government's payment on the total debt held by the public	<b>2</b>	Net interest will contribute to the national debt change.
	<b>SOCIAL ATTITUDE</b>	A social attitude is an acquired tendency to evaluate social things in a specific way. It's characterized by positive or negative beliefs, feelings and behaviors towards a particular entity.	<b>1</b>	Social attitudes toward the national debt will be prevalent in future federal budget decisions.
<b>CLIMATE CHANGE (1)</b>	<b>GREENHOUSE GAS CONCENTRATION</b>	Anthropogenic emission of greenhouse gas in our atmosphere	<b>3</b>	Green gas concentration is the primary factor to be control in climate change.
	<b>GLOBAL WARMING</b>	Global warming can be defined as when there is an increase of 2-degree Celsius average in temperature from pre-industrial levels	<b>2</b>	Global warming is #1 cause from Greenhouse Gas concentration.
	<b>GLACIER MELTING</b>	Heat in the atmosphere created by the emission of greenhouse gas will cause the ice sheets in Greenland and Antarctica to melt at a faster rate	<b>1</b>	Global warming is #1 cause from Greenhouse Gas concentration.

Source: Created by author.

A simple scale was provided of three regions for each indicator's effect on their variable as: Significant (+), Negligible, Significant (-). Therefore, each iteration between the indicators with permutation without replacement can have one of the three readings S+, N, S- to contribute to its variable. Then, each variable was provided a scale of five regions: Large+, Large-, Negligible, Small+ and Small-, from receiving the inputs from their three indicators (see table 6).

Table 6. Example of an Indicators' Scale

INDICATORS' IMPACT ON TECHNOLOGY GROWTH				
R & D INVESTMENT	INNOVATION	PATENTS ISSUED	RESULTS	SCALE
1	1	1	3	S-
1	1	2	4	S+
1	1	3	5	N
1	2	1	4	S+
1	2	2	5	N
1	2	3	6	L-
1	3	1	5	N
1	3	2	6	L-
1	3	3	7	L-
2	1	1	4	S+
2	1	2	5	N
2	1	3	6	L-
2	2	1	5	N
2	2	2	6	L-
2	2	3	7	L-
2	3	1	6	L-
2	3	2	7	L-
2	3	3	8	L+
3	1	1	5	N
3	1	2	6	L-
3	1	3	7	L-
3	2	1	6	L-
3	2	2	7	L-
3	2	3	8	L+
3	3	1	7	L-
3	3	2	8	L+
3	3	3	9	L+
1= Insignificant Impact (S-)				
2= Negligible Impact (N)				
3=Significant Impact (S+)				

Source: Created by author.

### Quantitative Findings

Finally, the Monte Carlo Simulation was used to explain the model. Savage (2009), in the book *The Flaws of Averages: Why We Underestimate Risk in the Face of*

*Uncertainty*, explains that assumptions that are based on averages are commonly incorrect. If we base our intuitions and decisions on the average of calculations, the results will be solutions based on the average of the variables in the problem and not the whole problem. One of the recommendations that he provides to test models is the Monte Carlo Simulation. He claims that the Monte Carlo Simulation will replicate the various challenges or input probability distribution to the model and provide the complete risks or output probability distribution that could be faced. The Monte Carlo Simulation will show the most “probable, the worst and the best scenario” in the model. It will not focus only on the average or most precautionous decisions which would not be beneficial most of the time. The tails of the distribution curve matter in the model because they provide the probability of the least and best state of nature to occur. Decision makers will be able to track the indicators that could lead to the worst probability and not the average off all indicators mixed together.

### Monte Carlo Simulation Results

To conduct the simulation the following parameters were set for each of the elements of the model: Indicators (I), Variables (V), Questions (Q) and State of nature (SoN).

The total weight of all indicators (I) for each variable (V) needs to equal 6, since we can only contribute a weight between 1-3 for the indicators. The total weight of all variables (V) for each question (Q1 and Q2) needs to equal 10, since we can only contribute a weight between 1-4 for the variables. To set the conditions for the relationship between variables to the questions, 1 represents a positive contribution and -

1 a negative contribution. Each State of Nature (SoN) was given intervals between 1-100, Global Hegemony (85-100), Competing Superpower (51-84), Regional Power (16-50) and Homeland Defense (1-15) (see tables 7, 8, 9, and 10). For example, if the indicators innovation (I1), patents (I2) and Research and Development investment (I3) are decreasing, then that indicates a regression in the variable, technology (V1). That regression in technology could reduce productivity and puts stress on the GDP which will, consequently, put stress on the discretionary spending and defense spending.

Table 7. Indicators Weight

Each group of 3 should sum to						6					
Indicator weights											
Ind 1	Ind 2	Ind 3	Ind 4	Ind 5	Ind 6	Ind 7	Ind 8	Ind 9	Ind 10	Ind 11	Ind 12
2	3	1	3	2	1	3	2	1	2	3	1
		6			6			6			6

Source: Created by author.

Table 8. Variables Weight to Q1 and Q2

Weights for Q1 (size of pie)				Weights sum to:	Weights for Q2 (percentage of pie)			
Var 1	Var 2	Var 3	Var 4		Var 1	Var 2	Var 3	Var 4
2	4	3	1		2	4	3	1
			10					10

Source: Created by author.

Table 9. Variables Relationship to Q1 and Q2

	Relationship: Variables to Questions			
	Var 1	Var 2	Var 3	Var 4
Q1	1	-1	-1	-1
Q2	1	-1	-1	-1

Source: Created by author.

Table 10. State of Nature Parameters

States of Nature	
85-100	Global super power
84-51	Competing Superpower
50-16	Regional Power
15-1	Homeland defense

Source: Created by author.

Based on current evaluation of the indicators and variables, 65 was selected to represent the current state of nature because it is the midpoint of the "Competing Superpower" SoN. That number was selected because:

1. The US military force and capabilities are being reduced, which forces the US to rely on alliances, partnerships and collaboration with other superpowers to maintain global order and
2. Other emerging powers, like China and Russia, are increasing their influence in the world and challenging the US ability to act.

We ran the Monte Carlo Simulation 10,000 times and 1000 samples were drawn from the 10,0000 samples database. A table that tests a 10-year “run” 3000 times was calculated to understand the control limits for normal signaling while observing the standard deviation.

Table 11. Sample of the Result for 10 Years Within 5 Runs

Year	max	avg+2	avg+1	avg	avg-1	avg-2	min	stdev	Run 1	Run 2	Run 3	Run 4	Run 5
1	76.2	71.4	68.3	65.1	62.0	58.8	52.2	3.2	69.8	66.6	65	68.2	62.6
2	81.0	74.4	69.8	65.3	60.7	56.2	49.0	4.6	71.4	62.6	67.4	66.6	64.2
3	86.6	76.5	70.9	65.4	59.8	54.2	44.2	5.6	71.4	60.2	68.2	65	61
4	86.6	78.3	71.9	65.4	58.9	52.5	41.8	6.5	71.4	60.2	65.8	65	53.8
5	89.8	79.9	72.7	65.5	58.2	51.0	40.2	7.2	71.4	61	68.2	64.2	49
6	95.4	81.4	73.5	65.5	57.6	49.6	38.6	8.0	73.8	56.2	65.8	64.2	47.4
7	97.8	82.8	74.2	65.6	57.0	48.4	37.0	8.6	75.4	53.8	66.6	64.2	45.8
8	105.8	84.2	74.9	65.6	56.3	47.0	35.4	9.3	77.8	57	67.4	64.2	53
9	105.8	85.5	75.6	65.7	55.8	45.9	34.6	9.9	65.8	58.6	67.4	64.2	59.4
10	105.8	86.9	76.3	65.7	55.2	44.6	29.0	10.6	69	66.6	67.4	62.6	61

Source: Created by author.

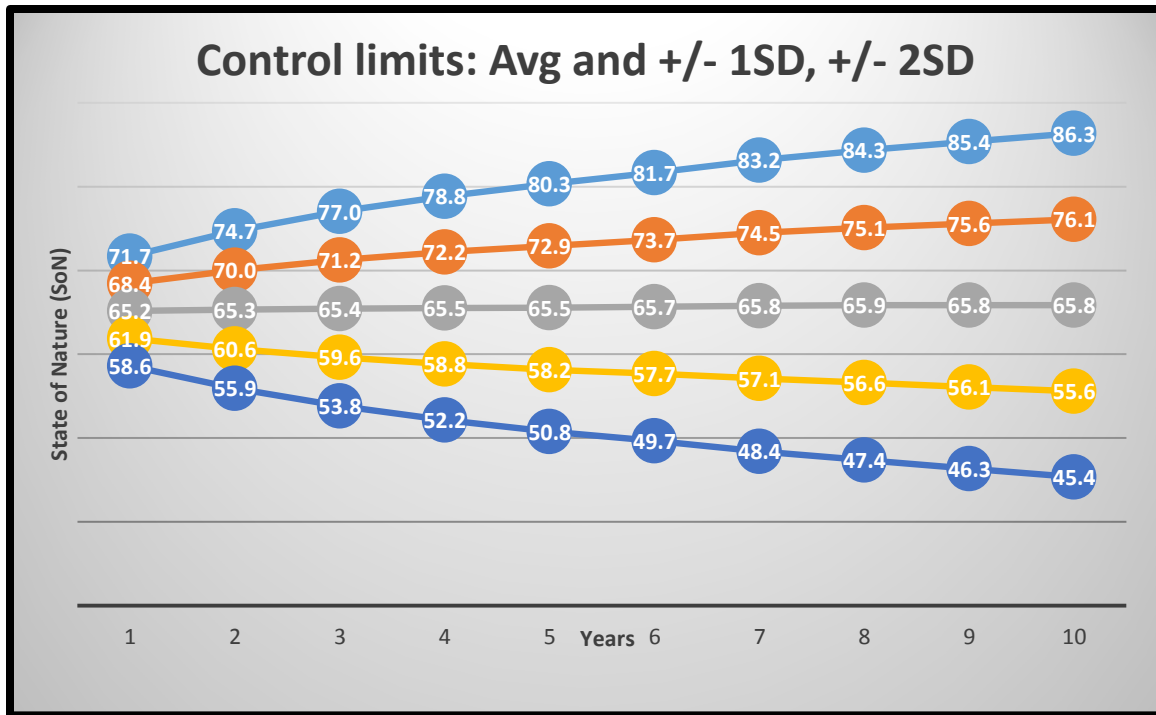


Figure 26. Graph of a Sample of the Result for 10 Years Within 5 Runs

Source: Created by author.

The figure above represents the possible state of natures (SoN) that can happen in 10 years in five different combinations of the elements of the model. For this research, 10 years was selected as the parameter, the normal standard deviation was set at 10.

The table below represents the standard deviation for 10 years. For example, a normal Standard deviation (SD) shows that the US will remain a competing superpower while dealing with all the changes in the variables and indicators to keep military funding abreast of challenges and threats. But, a +1SD will take the US to the top of the competing superpower region and more toward global hegemony in 10 years. On the other hand, the US could reach the bottom of the competing superpower region and more

toward regional power in four years with a -1SD. A +2SD can take the US to a global hegemony in 10 years. However, the US could reach regional power in 6 years.

Table 12. Graph of Standard Deviation for 10 Years

STATE OF NATURE	YEARS											VALUE
	0	1	2	3	4	5	6	7	8	9	10	
GLOBAL HEGEMONY											x	88
												87
								x		x		86
												85
												84
							x					83
									x			82
					x							81
						x						80
							x					79
COMPETING SUPERPOWER				x								78
												77
												76
											x	75
			x									74
										x		73
												72
		x										71
				x					x			70
			x				x					69
												68
		x			x							67
								x				66
	x											65
						x						64
		x										63
												62
			x									61
												60
												59
												58
				x								57
												56
												55
												54
					x							53
												52
												51
REGIONAL POWER						x	x					50
												49
								x				48
												47
										x		46
									x			45
												44
												43
												42
										x		41
												40

Source: Created by author.



During the research the following findings were recorded or applied to evaluate the elements of the model, test its validity and produce further research requirements.

Those findings were:

The selection of the variables was less extensive than the indicators. The NSS, NMS, QDR and the “Global Trends” series provided substantial evidence that economic, social, environmental and technological trends must be incorporated in any future military strategic planning. All four documents include the same category of challenges and threats that are growing or emerging as complex systems.

While trying to narrow down the selection of the variables, it was discovered that social spending was the most important variable that will continue to stress budgetary decisions because they are predictable. The variables must be key aspects that need to be examined at all levels of military planning to correctly forecast military strategic priorities and postures. The variables should be tracked annually in regard to the federal budget.

While trying to narrow down the selection of the indicators we found that entitlement spending was the most important indicator that will continue to impact budgetary decisions because it will continue to increase soon due to generational trends. All indicators must provide insight on how their variables are impacting the drivers in the model. The indicators must be tracked quarterly to provide quantifiable data that can be analyzed to show qualitative trends. Criteria must be established for the selection of the indicators from a vast sample. For this research, the indicators were selected because they

were trackable over time, quantifiable, interdependent, had a blended relationship with their variables and their impact on future states of nature.

To provide decision makers options for the alternative state of nature, a portfolio of actions must be selected and be available for when they decide what strategic posture they are gravitating towards. For example, it could be proposed that decision makers invest in large scale global rapid-deployment capabilities of forces, if they want to adopt a “Global Hegemony” strategic posture. However, if they want to adopt a “Homeland Security” posture they should invest in national surveillance and maritime border patrol capabilities to protect the mainland and territories (see table 13).

Table 13. Portfolio of Action using an Adapting Strategic Posture

State of Nature	Primary Mission	Advantage	Risk	STRATEGIC POSTURE	Portfolio of action (Options)
Global Hegemony	Project power globally, control all warfare domains, Lead all coalition, partnership and alliance	Ready to conduct persistent conflict	Focusing resources in certain regions will reduce capabilities in other regions	"ADAPTING" Strategic Posture defining the current situation, predict its fruition and have a strategy to react to the different scenarios that can occur	Increase the force with personnel, resources and capabilities. Developed more intercontinental Ballistic Missiles (ICBM), Divisional Rapid Deployment and increase in Naval Fleet
Competing Superpower	Project power when necessary while Supporting all warfare domains, coalition, partnership and alliance	Relinquish more responsibilities to allies and partners	Allies are not ready to assume or execute operations. They accept risk to their security interest, not partnership. US interest does not match those of the alliances, partnership or coalition		Build partner capacity. Invest in capabilities' interoperability, information flow, combined warfare and create specific responsibilities and common interest for alliances, partnership or coalition
Regional Power	Provide a stabilizing presence in the western hemisphere, supporting all warfare domains, coalition, partnership and alliance only pertaining to the region of influence	offer better stability in the western hemisphere and focus on reducing the national debt and internal social problems	threats from other regions are not countered or receded		Maintain partnership capacity. Invest in capabilities' interoperability, information flow, combined warfare for a small contingency force and establish a common interest for alliances, partnership or coalition in the region of influence
Homeland Defense	Defend the homeland and support civil authorities' operations, conduct only humanitarian and disaster relief operations outside the homeland	maintain a safe and secure border. Help others while imbedded in UN, NATO or EU partnership, preserve US influence in the region	extremist threats in CENTCOM might increase. China and Russia could intensify military modernizations and execute an arms race with the US		Maintain a force with personnel, resources and capabilities to execute simultaneously all Homeland defense and support humanitarian and disaster relief operations outside the homeland.

Source: Create by author using the concept from Stuart E. Johnson, *A Strategy-Based Framework for Accommodating Reductions in the Defense Budget* (Santa Monica, CA: Rand Corporation, 2012).

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

This chapter will explain the logic behind the conclusions and recommendations from the analysis conducted in the previous chapter. The intent of the chapter is to address the main research question while answering the secondary questions. The author will elaborate on conclusions from the previous chapters to provide recommendations for further research and answer the final secondary question: can we develop a portfolio of actions (hedging and big bets) to guide the military through various possible national strategic postures?

#### Conclusion

The evidences from researching and exercising this model validates the primary research question and confirms that a descriptive strategic budgetary planning model, using the principles of the Balanced Scorecard and systems dynamics can be developed to provide insights into requirements that the military can use to effectively prioritize its planning and programming to match future capabilities for emerging national military requirements. The small-scale model can be adopted and developed to a large-scale while allowing decision makers to lead teams of professionals and experts, who will be able to manipulate and assess its concepts and procedures. The model will help military decision makers to be aware of the possible indicators with fiscal sustainability as a priority. Early identification of indicators will allow decision makers to forecast and advise politicians of the next strategic posture that corresponds with the future states of nature desired. This model could educate officers on how to visualize and forecast resources for future

planning while instilling economic thinking in our force. The process will make officers more valuable staff officers and commanders.

From this research, the author believes that fiscal sustainability should be the focus by reducing federal spending to service the national debt and have our military focus on becoming a “competing superpower” while acting as member of coalition and alliances. We do not need to be a Global hegemony if we cannot “afford it.” The model has proved that technology can continue to grow the GDP and minimizing the impact of climate change must be a priority by implementing policies and investing in clean energy. However, reducing the federal debt is crucial to our economy because social spending is inevitable in the next 15 years.

This research was conducted to be thought-provoking. The elements of the model are explicit in a sense that they can be replaced at different times to maintain the same end, which is to let decision makers know that there are indicators specific to certain variables that drive GDP, federal and the military budget. From the results of quarterly tracked indicators and annually monitored variables, the military could predict their effect on the drivers and forecast certain states of nature in the model. Any stress on the GDP will trigger decision makers to choose the strategic posture corresponding to the state of nature. That means, when different threats to military operations emerge and capabilities were not forecasted in military budget spending, decision makers will need to adopt a new strategic posture.

### Considerations for Further Research

While conducting the research and analyzing the model, the author realized that some additional sub-questions or statements were discovered and required further research. The author had to set parameters for the indicators, variables, drivers and define the states of nature with corresponding strategic postures. Some of the questions that will require further research are:

1. What type of analytic concept needs to be used to facilitate the best used of the model and
2. What specific parameters must be set to weight the indicators and variables to give them priorities?

### Recommendations

While researching and developing the small descriptive model, the author realized that building the large predictive model will require more elaborative, extensive, continuous research. The author realized that a professional model of that scope goes beyond one person's ability to create in nine months of individual effort. However, a small descriptive model was created to allow the author to unpack and research his assumptions, beliefs and findings about how the budgetary world works and describing a model which the decision makers might employ its analysis to make policy and future strategic decisions. The author's beliefs and assumptions were explicit to allow for logical consistency and clarity. The author could examine the model, define the elements of it, establish relationships among them and then combine the findings to make an informative judgment.

If the Department of the Army (DA) were to fund the next phase of this research, some of the author recommendations are:

1. A special staff must be selected including experts on elements of the model and,
2. Some concepts or “wargame analysis” must be applied or considered for further investigation of the model.

Some helpful concepts are: First, Super Crunching Concept could be applied in analyzing vast amounts of data, most of the time dissimilar and creating statistical results that influence decisions. Regression formulas could be created to analyze non-streamlined historical data to forecast the effects of many indicators to one important variable. However, the concept does not replace the human dimension, considering things like intuition, sensitivity, spontaneity or impulse (Ayres 2007). A super crunching concept can be applied to constantly update and create better correlations among the elements in the models.

Second, the Neural Network Concept will process information or data mutually or together from a node to produce more qualitative information and then correlated them to get a final data. Since data within the neural network concept is very adjustable, that makes this suitable to process information from the parameters sets for each element in the model to move to the next phase.

Third, a Perceptron Concept will produce outputs from inputs with specific logic. That could be a way to visualize the different state of future in the model (Shiffman, Fry, and Marsh 2012). A perceptron concept with specific parameters or biases could be

applied to make connections from each indicator to the variables, then to the drivers and all the way to strategic decisions formulated by military decision makers.

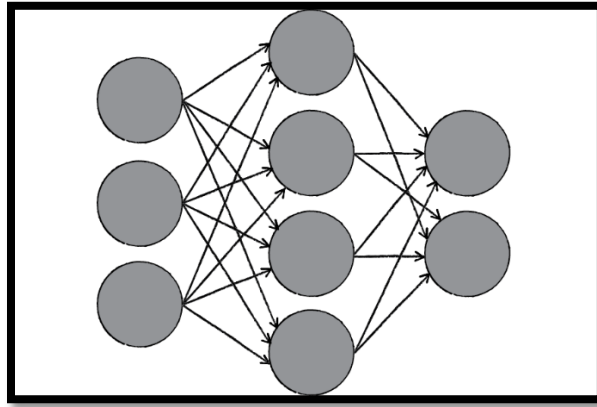


Figure 27. Neural Networks Concept

*Source:* Daniel Shiffman, Shannon Fry and Zannah Marsh, *The Nature of Code*, 2012.

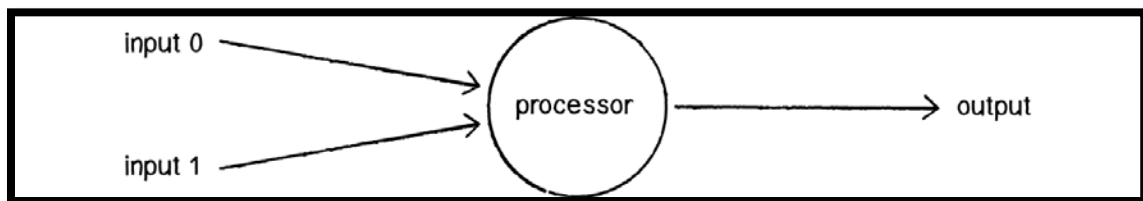


Figure 28. Perceptron Model

*Source:* Daniel Shiffman, Shannon Fry and Zannah Marsh, *The Nature of Code*, 2012.

Fourth, the Principal Component Analysis (PCA) can be used to help recognize repeated series or actions in data as trends and expressing that pattern explicitly to emphasize commonality and differences between the data points. PCA can be used to create the visualization of the pattern created by events (Smith 2011). PCA could be use



in the model to reduce large amounts of data and information, allowing the selection of the best indicators, variables and drivers.

Fifth, the Delphi technique will provide the judgement and intuition from experts to avoid collaborative expressions or decisions. It will provide different experts' views on the elements of the model to arrive at best solution (Helmer 1967). This technique could be beneficial for selecting the best indicators, variables and drivers from massive data with expert judgement.

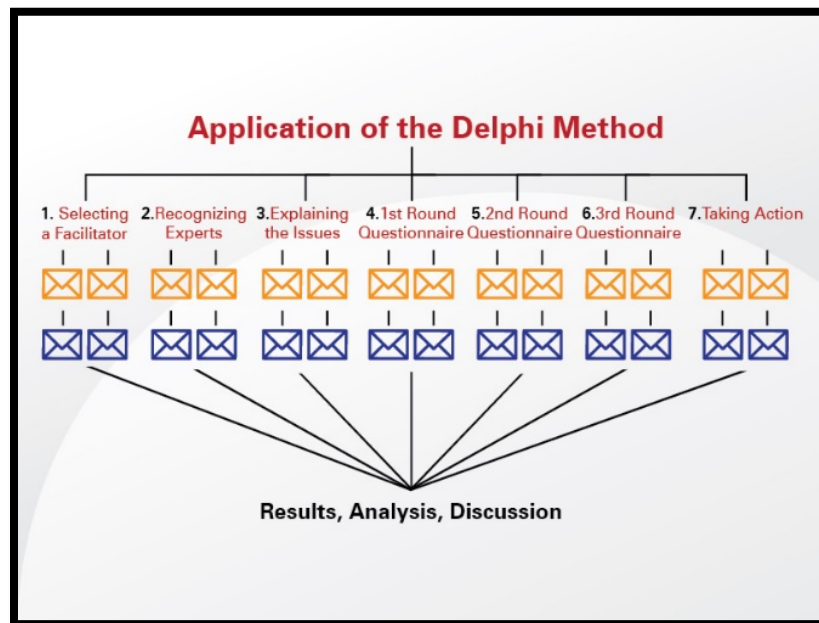


Figure 29. The Delphi Technique

Source: Tools4management, "Achieve Expert Consensus with the Help of Delphi Method," 2016, accessed February 2, 2017, <https://www.tools4management.com/article/achieve-expert-consensus-with-the-help-of-delphi-method/>.

The Capability-Based Planning and Portfolio Analysis could help identify capabilities for specific future threats or issues under certainty while keeping an economical approach to the results. The alternatives scenarios developed will have specific objectives and Portfolio analysis to provide decision makers different options while managing risk (Davis 2012).

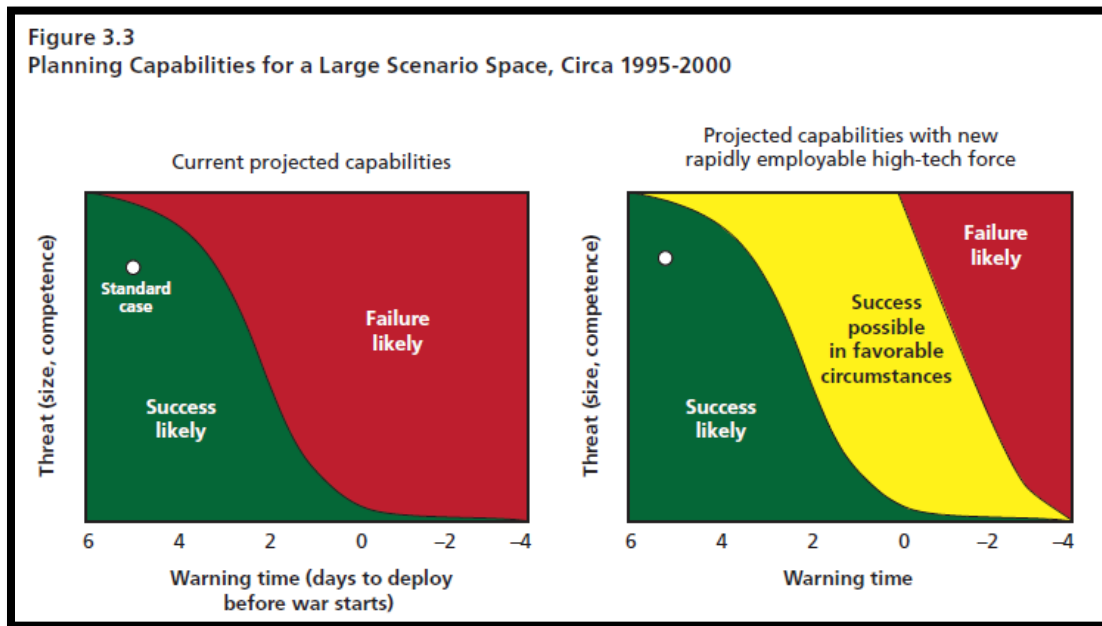


Figure 30. Capability-Based Planning Analysis

*Source:* Paul K. Davis, “Capabilities for Joint Analysis in the Department of Defense: Rethinking Support for Strategic Analysis” (Research Report, Rand Corporation, 2016), accessed March 13, 2017, [http://www.rand.org/content/dam/rand/pubs/research\\_reports/RR1400/RR1469/Rand\\_RR1469.pdf](http://www.rand.org/content/dam/rand/pubs/research_reports/RR1400/RR1469/Rand_RR1469.pdf).

All those concepts will streamline data, provide more concrete information and include experts’ judgement while conducting both qualitative and quantitative research. Those concepts are created to collect numerous data and created final data sets that

provide solutions, course of actions, or decision points to decide how to modify current policies to support future state of nature. They will protect the model from being executed with tunnel vision and complete biased decisions.

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